MARITIME HERITAGE MINNESOTA

Ann Merriman
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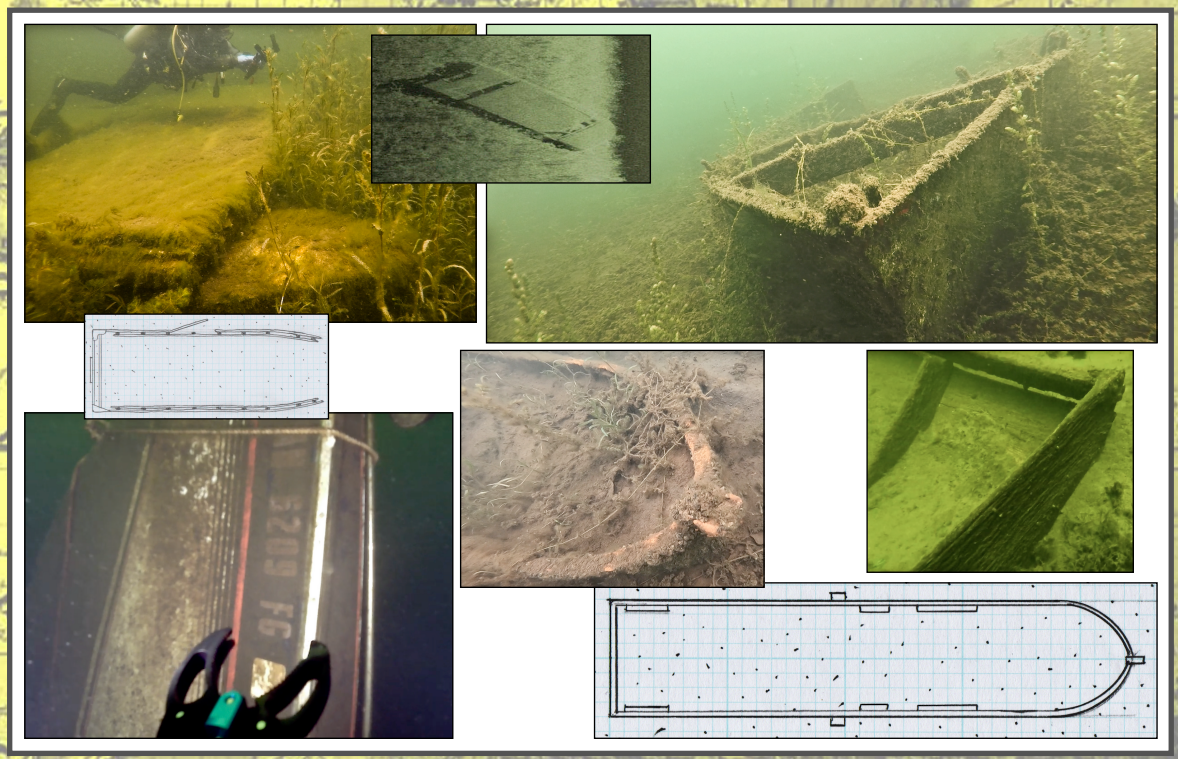
# Lake Minnetonka Nautical Archaeology 9 Project Report



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## Acknowledgments

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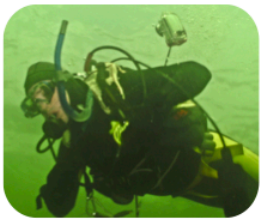
Underwater Archaeologist
Christopher Olson



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Volunteer Diver
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Josh Knutson

Trustee
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Mascots & Computing Cats
Weebles Cat & Rodney Cat

Volunteer
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Ann Nehowig

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MHM IS A 501.(c).3 NON-PROFIT CORPORATION DEDICATED TO THE DOCUMENTATION, CONSERVATION, AND PRESERVATION OF MINNESOTA'S FINITE MARITIME CULTURAL RESOURCES

*"ACHF grants have allowed a small St. Paul-based nonprofit, Maritime Heritage Minnesota (MHM), to re-establish the discipline of underwater archaeology in Minnesota. Without this support, MHM could not have conducted its groundbreaking nautical archeological and maritime historical research."*

*~Steve Elliott, Former Minnesota Historical Society CEO and Director, January 2015*

## Introduction

Wrecks and the artifacts associated with them tell a story. Removing or otherwise disturbing artifacts, treating them as commodities that can be sold, obliterates that story. Nautical archaeological and maritime sites are finite, and are significant submerged cultural resources. Nautical, maritime, underwater, maritime terrestrial – Maritime Heritage Minnesota's (MHM) deals with all of these types of sites throughout the State of Minnesota. MHM's Mission is to document, conserve, preserve, and when necessary, excavate these finite cultural resources where the welfare of the artifact is paramount. MHM is concerned with protecting our underwater and maritime sites – our shared Maritime History – for their own benefit in order for all Minnesotans to gain the knowledge that can be obtained through their study. MHM's study of wrecks does not include the removal of artifacts or damaging the sites in any way. MHM does not raise wrecks or 'hunt' for 'treasure'. Submerged archaeological sites in Minnesota are subject to the same State statues as terrestrial sites: the Minnesota Field Archaeology Act (1963), Minnesota Historic Sites Act (1965), the Minnesota Historic District Act (1971), and the Minnesota Private Cemeteries Act (1976) if human remains are associated with a submerged site. Further, the case of *State v. Bollenbach* (1954) and the Federal Abandoned Shipwrecks Act of 1987 provide additional jurisdictional considerations when determining State oversight and "ownership" of resources defined by law as archaeological sites (Marken, Ollendorf, Nunnally, and Anfinson 1997, 3-4). Therefore, just like terrestrial archaeologists working for the State or with contract firms, underwater archaeologists are required to have the necessary education, appropriate credentials, and hold valid licenses from the Office of the State Archaeologist (OSA).

MHM completed two side and down-imaging sonar surveys of Lake Minnetonka in September-November 2011 and May-June 2012 – the Lake Minnetonka Surveys 1 and 2 Projects (LMS-1, LMS-2). Prior to MHM's two comprehensive surveys, there was one recognized nautical archaeological site on the lake bottom and another five wrecks were known. MHM completed the Lake Minnetonka Nautical Archaeology 1-8 Projects (LMNA-1, LMNA-2, LMNA-3, LMNA-4, LMNA-5, LMNA-6, LMNA-7, LMNA-8) between 2012-2018. At the beginning of the Lake Minnetonka Nautical Archeology 9 Project (LMNA-9) in early May 2019, there were 77 known wrecks (including the Lake Minnetonka North Arm Dugout Canoe removed from the lake in 1934), 35 maritime sites/cultural resources, 1 doodlebug, 7 cars, 1 truck, 4 snowmobiles, 22 'other' objects, 2 sunken bogs, 20 cut tree stumps/cut trees/complete trees, 36 boulders/rocks/groups of rocks, and 93 false targets (vegetation, bottom contours) identified on the bottom of Lake Minnetonka.

## Preface

During the Lake Minnetonka Nautical Archaeology 9 Project (LMNA-9), MHM investigated 2 known wrecks and 47 unknown anomalies. Of these, 25 anomalies were documented using SCUBA, 21 anomalies were identifiable through remote sensing side and down imaging sonar alone, and 3 sites were investigated using an ROV (Remotely Operated Vehicle). The fieldwork was conducted from early June to early October 2019.

## Results of the Lake Minnetonka Nautical Archaeology 9 Project

### Research Design

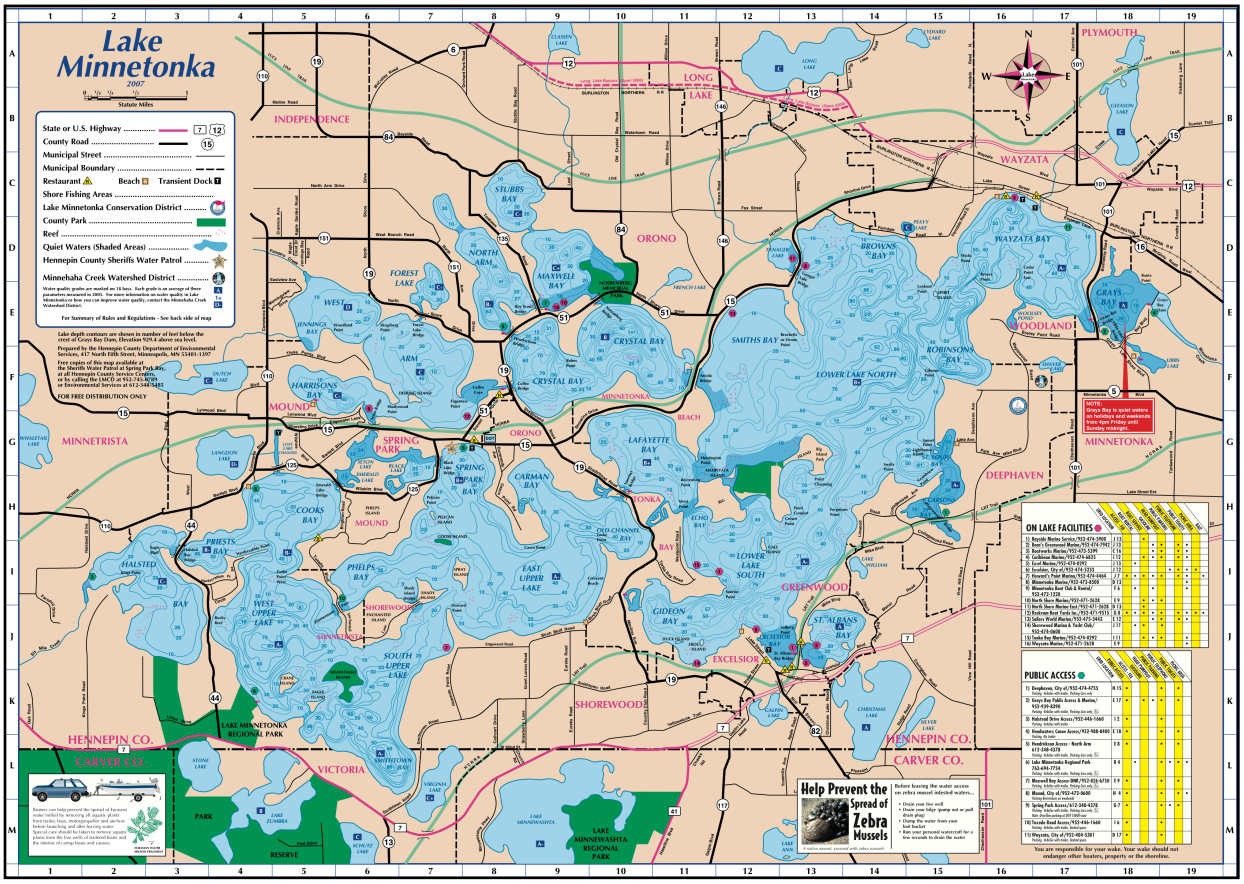
A goal of the LMNA-9 Project - in addition to identifying previously recorded anomalies on the lake bottom - was to conduct targeted side and down imaging sonar survey in shallow areas of the lake prior to seasonal vegetation growth. Re-investigating shallow areas using remote sensing - under conditions that differed from the original survey - has produced significant results. Without thick weeds to block the sonar beam from extending to the lake bottom or obscuring submerged cultural resources, MHM has been identifying a significant number of wrecks and sites in the shallow water. MHM determined which anomalies would be investigated from an analysis of sonar data recorded between 2011-2019. Each anomaly was assigned a number upon its recognition as a possible site. The Clarity of some data provided by the side and down-imaging sonar equipment allowed for the identification of several anomalies without conducting reconnaissance using SCUBA.

The 24 unknown anomalies examined using SCUBA during the LMNA-9 Project were A492, A740, A743, A755, A756, A757, A758, A764, A770, A771, A772, A776, A778, A784, A780, A787, A793, A798, A801, A802, A803, A805, A809, and A815. As determined by their distinct sonar signatures, MHM contended that A756, A757, A764, A784, and A787 were wrecks prior to their investigation using SCUBA. Further, Nick Nothom of Digilabs and MHM volunteer Kelly Nehowig assisted MHM in the investigation of unknown anomalies A482 and A749, and the deep wreck *Minneapolis* (21-HE-403) using an ROV (remotely operated vehicle). Additionally, MHM re-visited the *Theta* Wreck site (21-HE-514) to test a photographic technique, with mixed results. Lastly, MHM targeted 21 anomalies (A283, A626, A628, A655, A656, A699, A700, A704, A705, A706, A730, A752, A753, A759, A760, A761, A763, A779, A788, A799, A804) using sonar and identified them without diving on them during the project. Using data accumulated from the fieldwork as a starting point, MHM conducted research to place newly recognized nautical archaeological sites and anomalies into their historical contexts. Minnesota Archaeological Site Forms were filed with the OSA when appropriate.

### Methodology

The methodology used to identify and rudimentarily document underwater archaeological anomalies is straightforward. MHM used the GPS coordinates of a wreck or an anomaly - and in the case of LMNA-9 the sonar footage was newly recorded - to drop a weighted diver down buoy near the target. The dive boat anchored a short

distance away from the buoy and divers geared up for the dive. At any given time, there were between two and four divers underwater. If the buoy anchor weight landed near and sometimes on the anomaly or wreck, no search for the target was conducted. However, for a variety of reasons, a brief search for the target was conducted until it was located or it was determined that the anomaly was a false sonar return. If a cultural or natural resource was located, the divers photographed and recorded video of the site or object, logged its basic measurements, examined any obvious attributes, and measured sediment build-up (if appropriate).



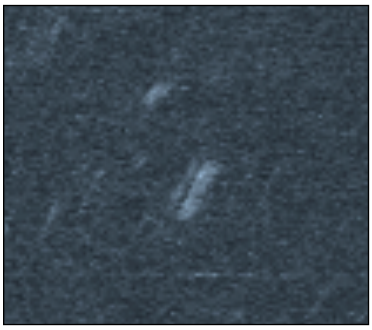

Lake Minnetonka (Lake Minnetonka Conservation District).

## Results

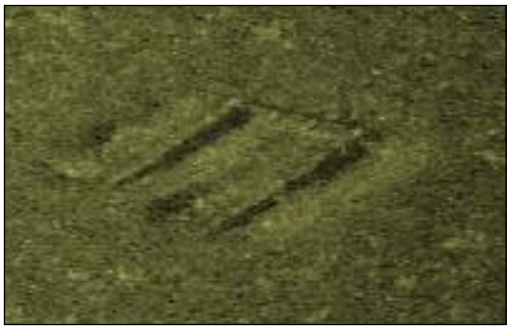
After the completion of the LMNA-9 Project fieldwork in October 2019, there are now 83 identified wrecks on the bottom of Lake Minnetonka or that were once on the bottom, including a Woodland Culture dugout canoe removed from the lake in 1934. Of these wrecks, 53 of them have 52 Minnesota archaeological site numbers; 2 wrecks are features of one site. Further, 4 other types of maritime sites have archaeological site numbers and there are 37 maritime sites or objects without numbers. Additionally, 43 'other' objects have been identified that do not have site numbers, among them 13 vehicles that include 4 snowmobiles, 1 truck, and 8 cars. During the LMNA-9 Project specifically – of the 47 unknown anomalies and 2 known wrecks investigated – MHM and its volunteers accumulated important data about the wrecks and confirmed the existence of 7 new wrecks, 5 new submerged maritime sites, 9 ‘other’ sites/objects that includes 1 car, 4 trees, 5 big rocks, and 16 false sonar returns.

**Open Barge Wreck Site, 21-HE-529 (Anomaly 784)**

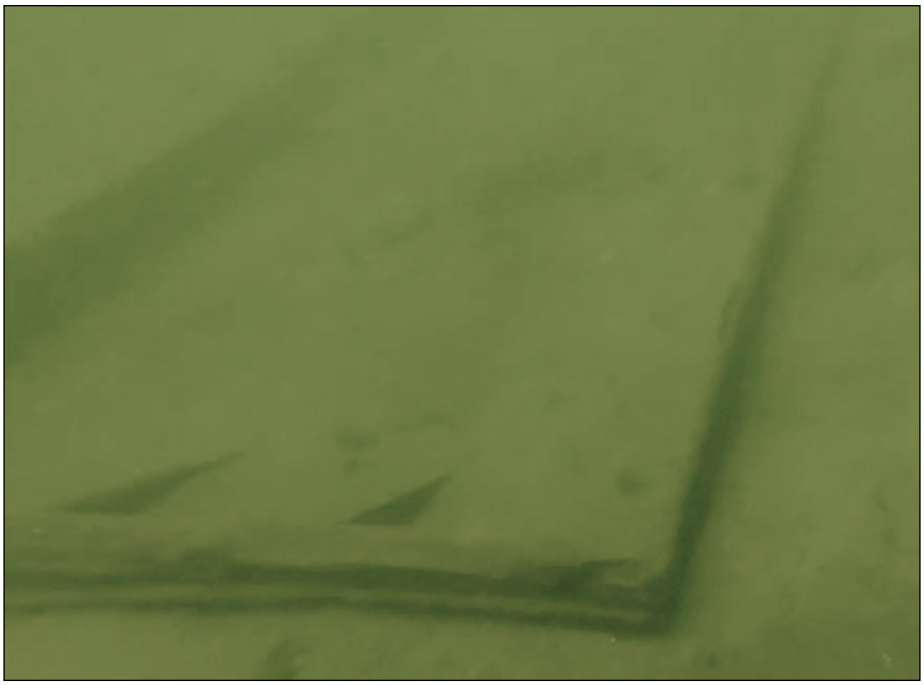
MHM recorded a poor quality sonar image of Anomaly 784 in 2011 during the LMS-2 Project. Using the improved sonar unit, a distinct sonar image of the anomaly was recorded in 2019 that clearly indicates that it is a barge wreck. The Open Barge Wreck is 22.50 feet long, 6.00 feet in the beam, with a 1.80 foot depth of hold. The wreck is constructed of wood, partially buried, with about 11.00-12.00 feet exposed. MHM located the covered end by using a probe. The visible end is square and raked upward, and could be described as a 'scow end'. The shallow depth of hold indicates the vessel had low freeboard and when filled with cargo, she would have been prone to swamping. However, the raked end or ends would have assisting the boat to move through water with less resistance and with increased stability. The exposed end has a thick caprail on the gunwale that extends around the wreck's corners; each corner has a 1.00 foot wooden caprail piece that is joined with the end caprail, creating a 90 degree angle. Interestingly, the 3 caprail pieces were formed by smoothing out rough tree branches; they do not have sharp edges like cut plank wood, and knots are visible. The caprail and another plank below it at the wreck's end provided the vessel with the strength and rigidity needed to carry cargo successfully.

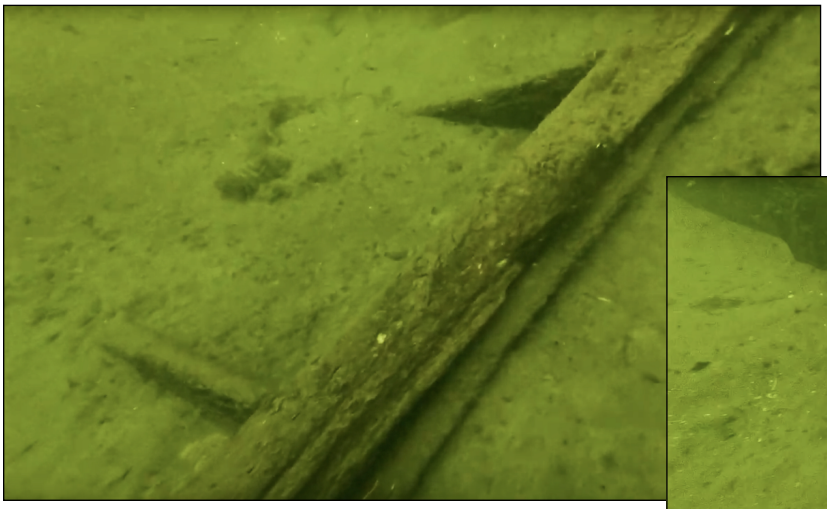


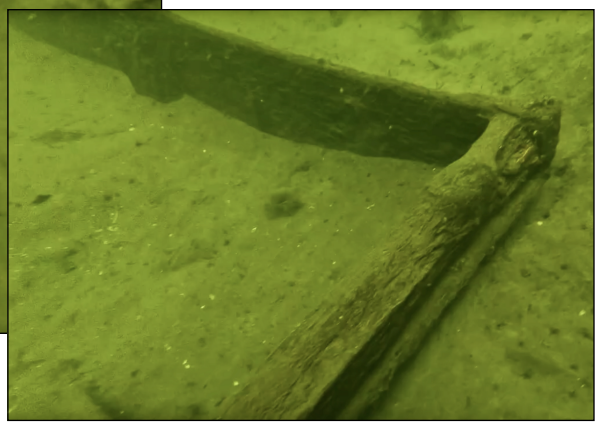
Two sonar images of the Open Barge Wreck Site, one from 2012 (left) and the other, more detailed image from 2019 (right).



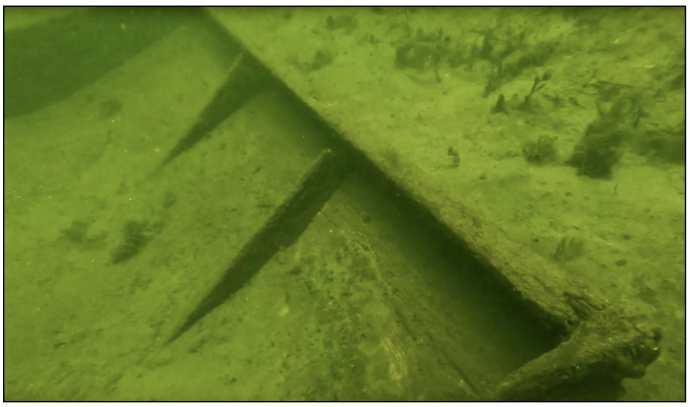
The wreck's sides are comprised of thin side planks and with the exception of the corners, the gunwale has no caprail. The flat-bottomed wreck has athwartships planking similar to the Hopper Barge Wrecks (21-HE-441) in Lake Minnetonka, vessels that also have raked ends. Two sturdy longitudinal stringers are attached to the vessel's bottom and extend to the end of the wreck; they emerge from the silt inside the boat. Originally the stringers would have connected to the vessel's end, but time on the lake bottom has separated them. Three frames - futtocks - are attached to the more exposed side of the wreck and on the other side, only 2 futtocks are seen; MHM suggests there are a total of 5 futtocks on each side of the vessel. The 2 frames/futtocks on each side of the wreck toward the exposed end are narrow planks; the 3rd example on the more exposed side is a wide flat plank. The width difference suggests that the strongest frame/futtock is located at the midpoint of the vessel. The wreck may have ceiling planking, but this cannot be determined at this time because of the silt inside the hull. MHM contends the barge was likely constructed without a deck, suggesting it would carry bulk cargo such as sand, mud, gravel, and stones. The Open Barge Wreck was likely constructed in the 1880s into the early 1900s, and a site disposition date of 1915 is reasonable. The nearly 2.00 feet of sediment built-up on one end of the wreck supports this supposition when compared to other wrecks in the area. MHM submitted an archaeological site form for the Open Barge Wreck to the OSA in December 2019 and received her site number, 21-HE-529, at that time.

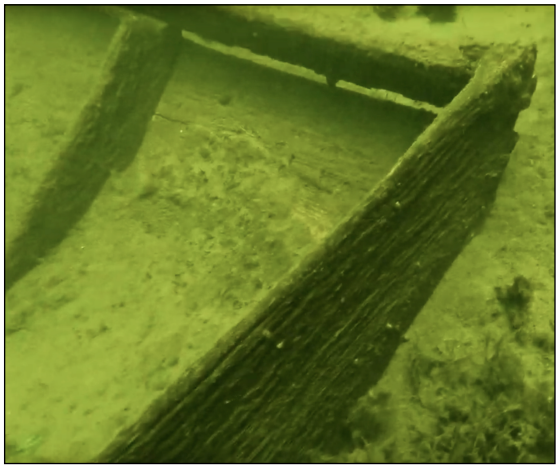


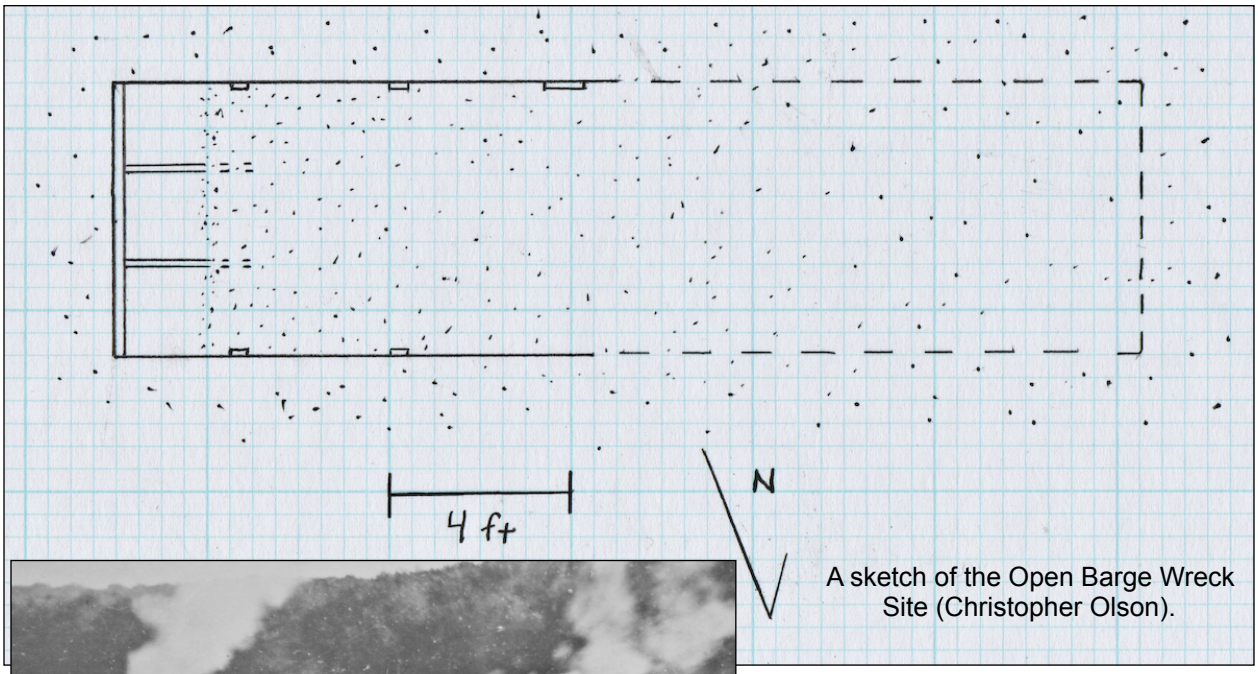




Views of the Open Barge Wreck Site (Kelly Nehowig).







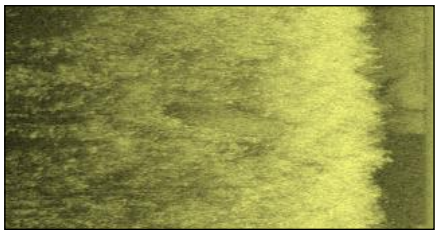

A sketch of the Open Barge Wreck Site (Christopher Olson).

A Lake Minnetonka barge decorated for a pleasure cruise with power provided by tug *76*. This barge is larger than the Open Barge Wreck and she has a deck, but the design and construction are similar (MNHS HE5.14r8, digitized by MHM).

**Overturned WoodenScow Wreck Site, 21-HE-531 (Anomaly 776)**

As one goal of the LMNA-9 Project, targeted sonar re-scanning of the lake's shallow areas prior to extensive seasonal weed growth allowed MHM to recognize the sonar signature of Anomaly 776. The Overturned Wooden Scow Wreck is 12.00 feet long and 4.00 feet in the beam; the depth of hold is unknown due to the capsized nature of the wreck. Constructed of wood, the wreck has scow ends -meaning the bow and stern are squared-off - and she is longitudinally planked. The wreck has a central plank along her midline that is narrower than the other bottom hull strakes. On either side of the central plank, the hull bottom is comprised of an additional 3 strakes that form a flat bottom. The 4th strake on either side curves gently at the bilge, creating a soft chine. Anomaly 776's sides have separated from the wreck's bottom and they have splayed out onto the lake bottom, the starboard side more drastically than the port side. The transom has also splayed outward from the wreck on the starboard side, and the quarter has collapsed. The stem remains intact. The starboard side of the wreck consists of 3 strakes whose ends are deteriorated where they separate from the bow. Due to the 'spread-out' nature of the wreck - even though she is capsized - her interior construction can be somewhat  described. The wreck has thin frames attaching the strakes to each other and providing rigidity for the boat; these structural pieces can be seen in the gaps between the strakes that have developed from wood deterioration and loosening of the hull.

Two very different sonar images of the Overturned Wooden Scow Wreck Site, both from 2019.



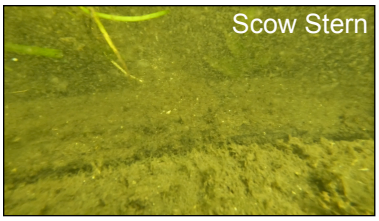
In consideration of a construction date for Anomaly 776, MHM contends the vessel was constructed in the 1890s. Small wooden boats on Lake Minnetonka had several designs that depended on purpose, wood type, and design; design reflected a vessel's purpose and price; and wood type affected price. Anomaly 776's flat bottom and soft chine suggest she is a duck boat but her square ends suggest a jon boat. However, a jon boat would have raked ends and is usually constructed of large plywood pieces and not individual strakes. Further, duck boats were often designed like kayaks with semi-enclosed hulls above the waterline and at least 1 - if not 2 - pointed ends. Since Anomaly 776 is overturned and her sides have detached or splayed-out, and the inner hull details cannot be assessed, her specific design is unknown. However, the Overturned Wooden Scow Wreck's shallow draft and low freeboard indicates she was used in still waters, whether for duck hunting or fishing. Lastly, her scow ends suggest she may be a home-build, since square ended boats require less skill to construct than examples with pointed ends. MHM contends Anomaly 776 sank around 1910-1915. MHM submitted an archaeological site form for the wreck to the OSA in early December 2019 and received her site number, 21-HE-531, at that time.

Scow Bow

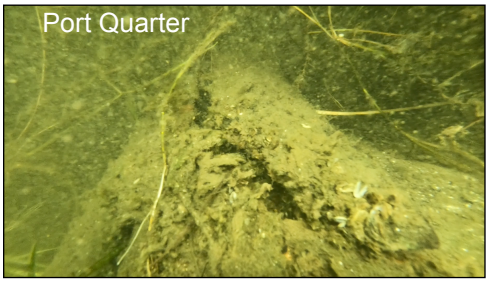
Photographs by Kelly Nehowig

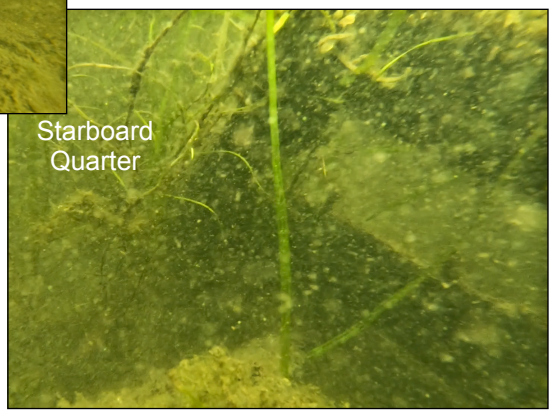
The Detached Starboard Bow

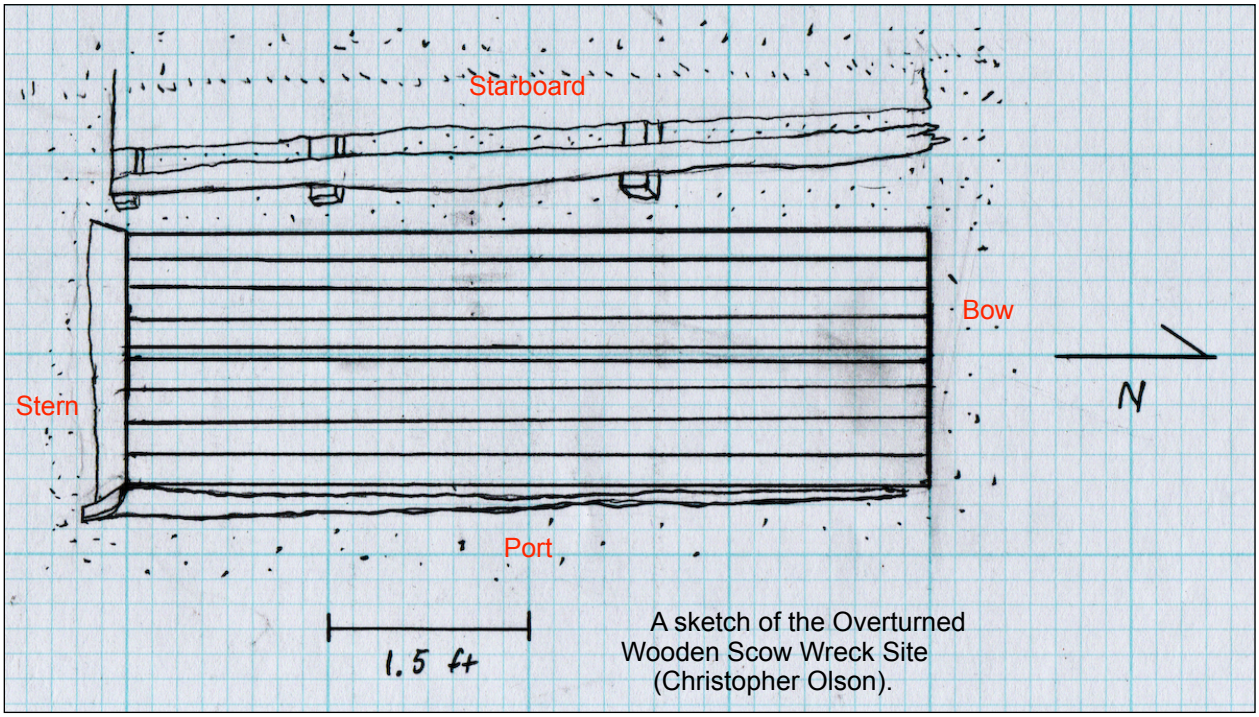
Turn of the Starboard Bilge



Photographs by Kelly Nehowig



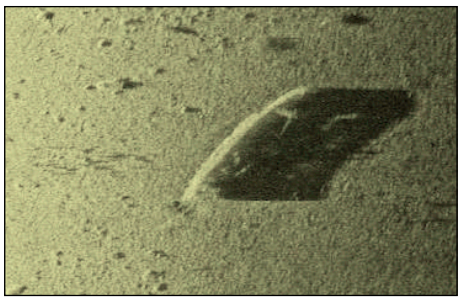



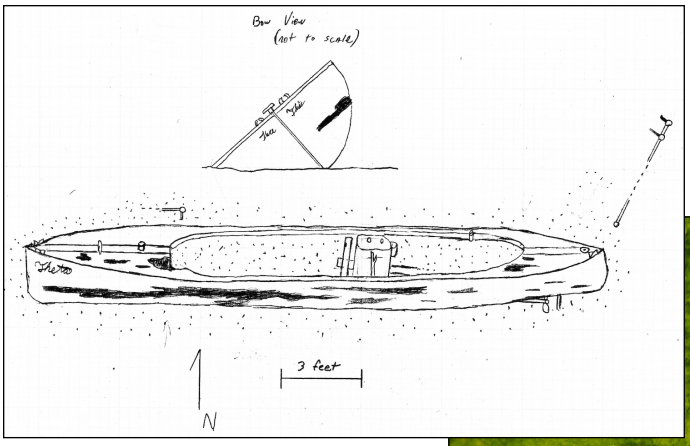

A sketch of the Overturned Wooden Scow Wreck Site (Christopher Olson).

## *Theta* Wreck Site, 21-HE-514 - Site Assessment Update

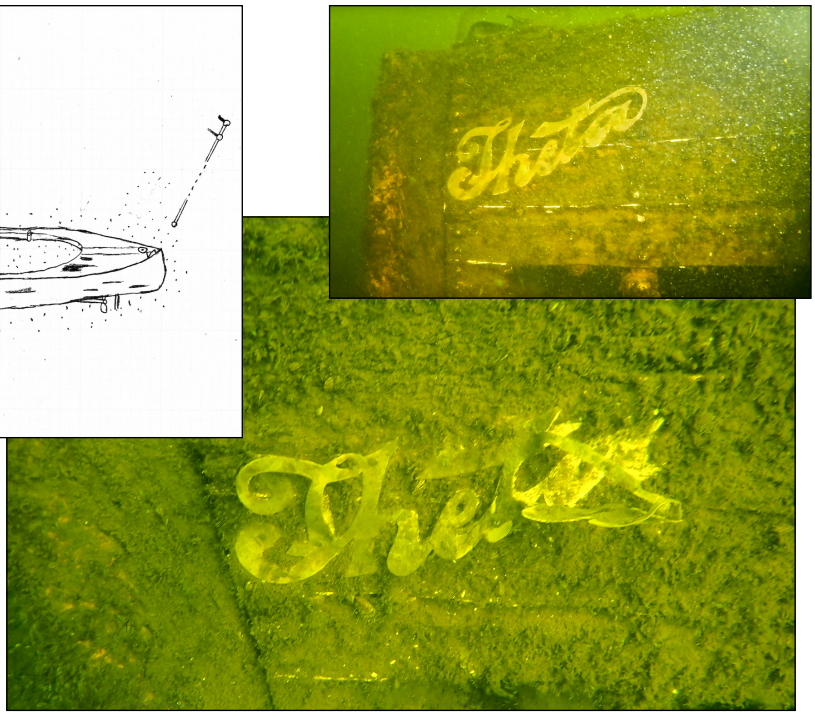
MHM and volunteer Kelly Nehowig re-visited the *Theta* Wreck (21-HE-514) in June to test a photographic technique. At that time, it was discovered that the wreck had sustained damage sometime since early September 2018. Initially, MHM suspected that a looter had attempted to illegally remove the wreck's port side name plate. However, upon re-analyzing the site, MHM now contends either an anchor or strong fishing line caused the damage to the wreck. MHM will seek permission from the OSA in 2020 to mitigate the damage and take measures to prevent further damage in the future. MHM submitted an Archaeological Site Form Update to the OSA.



Sonar 2018




A sketch of the *Theta* Wreck (Christopher Olson)

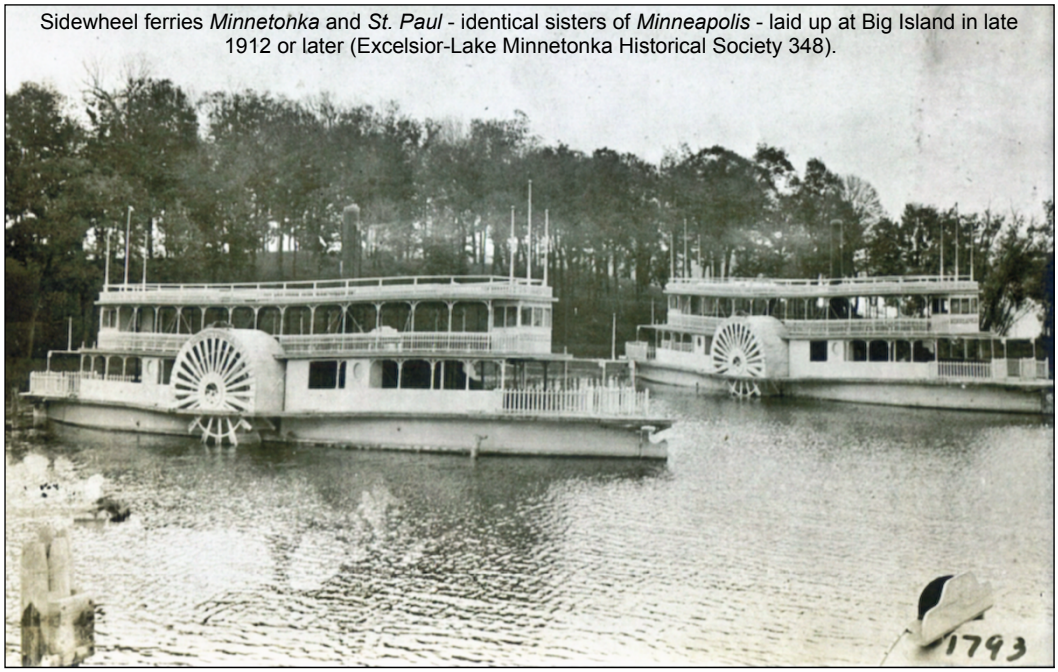


*Theta's* name plate in 2018 (MHM) and in its damaged state in 2019 (Kelly Nehowig). Note the white paint exposed when the overlaying letter 'a' and part of the 't' were bent from the hull.

## ***Minneapolis*** **Wreck Site, 21-HE-403 - Site Assessment Update**

Captain John R. Johnson of Excelsior designed and constructed sidewheel steamer *Minneapolis* and her sisters *Minnetonka* and *St. Paul*, at Solberg Point on Lake Minnetonka in 1905-1906 for the Twin City Rapid Transit Company. These ferries were for their customers traveling from Excelsior to the Big Island Amusement Park. The ferries were 109.00 feet long and 35.00 feet in the beam, were double-ended with pilot houses and rudders at both bow and stern, and were propelled by sidewheels. After one season of disappointing performance, the ferries were lengthened to 142.00 feet long

Sidewheel ferries *Minnetonka* and *St. Paul* - identical sisters of *Minneapolis* - laid up at Big Island in late 1912 or later (Excelsior-Lake Minnetonka Historical Society 348).



with a 39.00-foot beam. This design was better suited to handling her heavy equipment and increase the boat's freeboard. With the closing of the amusement park, *Minneapolis* was redundant and it was planned for her to be set ablaze in the hopes to make some last profit from her, emulating the success of the *George/Excelsior* burning in 1909. She was burned on 8 August 1912, witnessed by a crowd that rivaled the 1909 show, with people traveling from the Twin Cities to watch the spectacle (*Minneapolis Morning Tribune* 1912; *Minneapolis Tribune* 1899; *Minnetonka Record* 1906b, 1912a, 1912b; Olson 1976, 308; TCRT Records 1905-1907). MHM completed a Minnesota archaeological site form for *Minneapolis* in December 2011, acquiring number 21-HE-403 at that time.

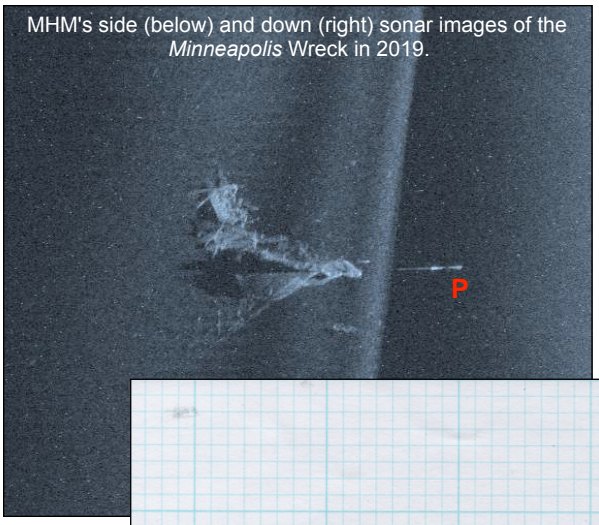
Sidewheel steamer *Minneapolis* as she looked at the time of her sinking (MNHS HE5.13p37).

In May 2019, Nick Nothom of Wayzata's Digilabs and MHM volunteer Kelly Nehowig set up a collaboration with MHM to visit the *Minneapolis* Wreck (21-HE-403) to record the site using an ROV. Nothom expertly piloted the ROV around the complicated site for over 3 hours and recorded quality video. Due to the site's depth of 70-75 feet, sun does not always reach the lake bottom, simulating a night dive. However, some sunlight reached the lake bottom on the day of the research to assist the ROV's lights in illuminating the wreck, up to 15.00 feet in places. After video footage reviewal, MHM has recognized several specific attributes of the site that allow for a much greater understanding of the wrecking process. While *Minneapolis* and her sisters were double-ended ferries with rudders on both ends, they did have designated bows and sterns.

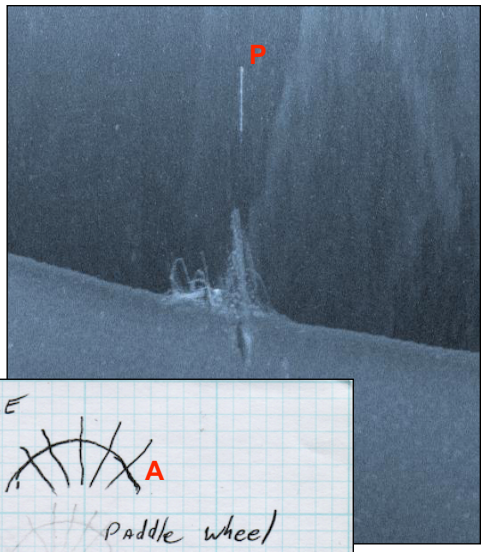
The smokestacks on these ferries were placed forward of amidships; therefore, the ends of the vessels closest to their stacks are the bows. Also, because the ferries were double-ended, they did not have to turn around at Big Island or at Excelsior when they had either picked up or dropped off their riders. The helmsman would man the pilot house on the opposite end, and the engineer put the vessel in reverse; the boat then 'backed-up' to her destination. Photographic evidence clearly shows the three ferries at their Twin Cities Rapid Transit Company pier with their bows pointing toward Big Island; in this configuration, the boats would have steamed forward to the island and backed-up in reverse to dock at Excelsior.

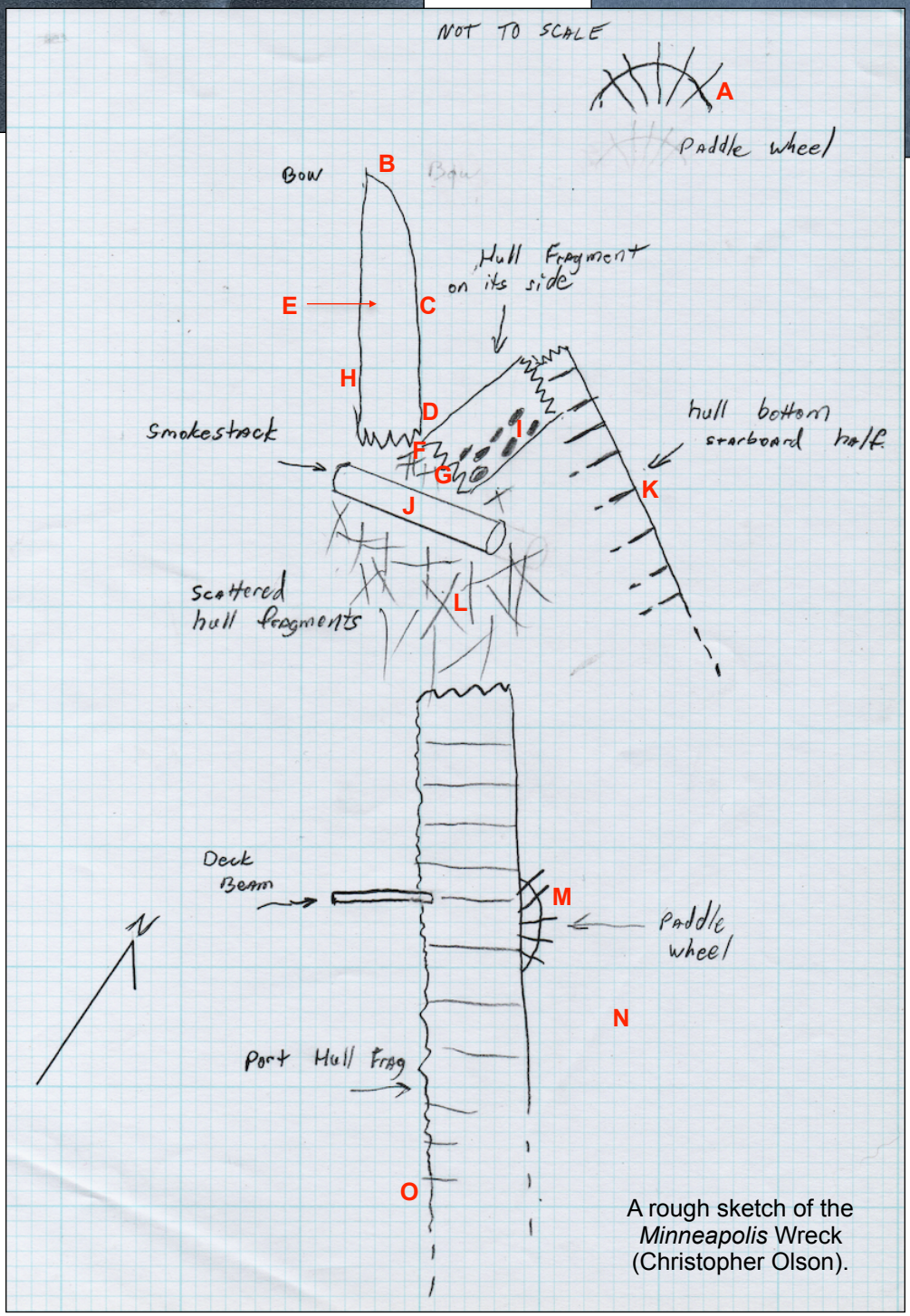
Based on observations, MHM contends that as the sidewheeler burned on the surface, the wooden superstructure was engulfed and destroyed. The stern, which was pointed toward the south, burned more thoroughly than the bow. Because of this, the more intact bow was much heavier than the stern - it sank to the lake bottom first, hitting hard. The forward rudder and the pointed bow are buried in the bottom silt at a somewhat steep angle. Further, this portion of the hull is listing to port so that from the starboard side of the wreck, the intact outer hull and sponson are clearly seen. The wood that comprises the outer hull and sponson is in excellent condition. Some of the main deck survives, but further aft where the superstructure once stood, the inside of the hull is visible. Further aft, the momentum of the sinking boat and her abrupt stop upon hitting the bottom broke *Minneapolis's* back and caused the bottom of the hull to jackknife; a 20.00 foot tall 'peak' was created by the 'folding' of the hull. This 1st hull break exposed the inside bottom of the hull, with a keelson, stringers, floors, and boiler mounts visible; cocked hats, frames, and burned outer hull are seen at the turn of the bilge. At the junction where the 'bottom' of the sandwiched section goes into the lake bottom silt, a section of hull - the 2nd hull break - lies flat on her keel. Measuring around 40.00 feet long, this 'upright' section of the wreck runs parallel to the bow but it is located aft and to starboard. The hull's bottom in this section is buried in small bit of silt, but the turn of the starboard bilge is clearly seen on the outer hull and frames and cocked hats are recognizable on the inner hull.

Just aft of the sandwiched segment, the smokestack lies dislodged from the wreck with its base lying to starboard; it likely slid toward the bow during the wrecking process since it lies significantly forward of its original location. Around the stack, a jumble of wood and metal is visible, and the hull bottom likely survives under the silt. Further aft, a section of the port hull has detached from the hull bottom and has 'fallen over' - with the inside facing upward - lying on top of the still-attached sidewheel. The port sidewheel lies on the lake bottom, settled into the silt, with only part of the wheel spokes and blades revealed. Further aft, the hull was almost completely destroyed by fire and it trails off into the silt. Also, during the wrecking process, the starboard sidewheel detached from the *Minneapolis* at some point and hit the lake bottom 20 feet from the wreck's starboard bow. Throughout the large sections of the wreck, the metal hogging chain system is seen in the form of 'hogging rods' and interconnecting turnbuckles. Lastly, the protective tube for the steering line remains intact and *in situ*, attached to the wreck in its original position at the bow. Decades ago, recreational SCUBA divers attached a buoy to the port sponson and another guide line that leads off the wreck to the starboard sidewheel. MHM submitted an Archaeological Site Form Update for *Minneapolis* to the OSA.




MHM's side (below) and down (right) sonar images of the *Minneapolis* Wreck in 2019.




A rough sketch of the *Minneapolis* Wreck (Christopher Olson).

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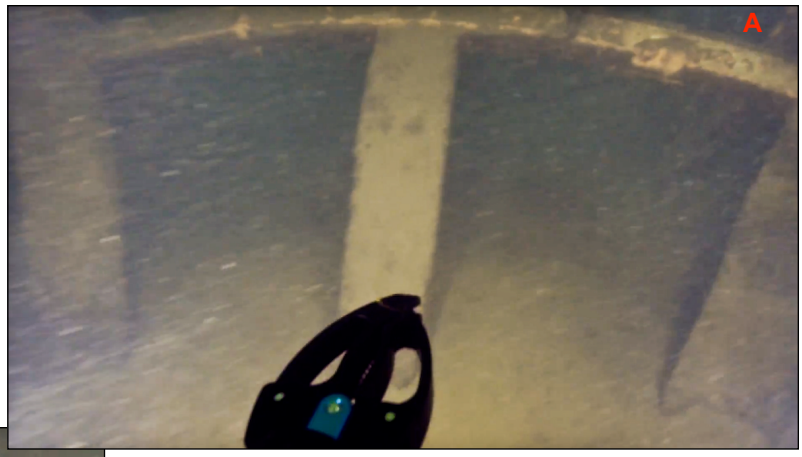
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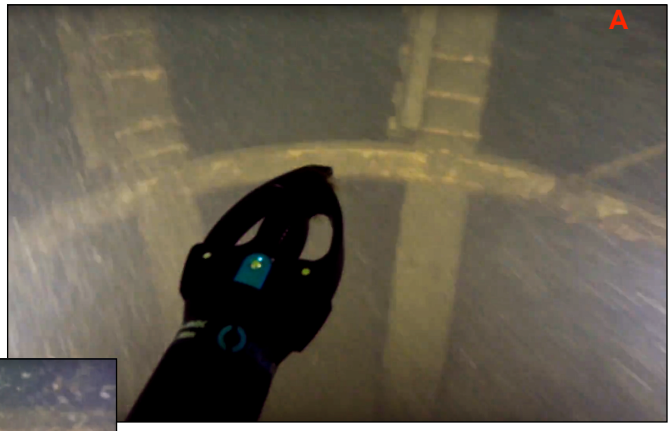
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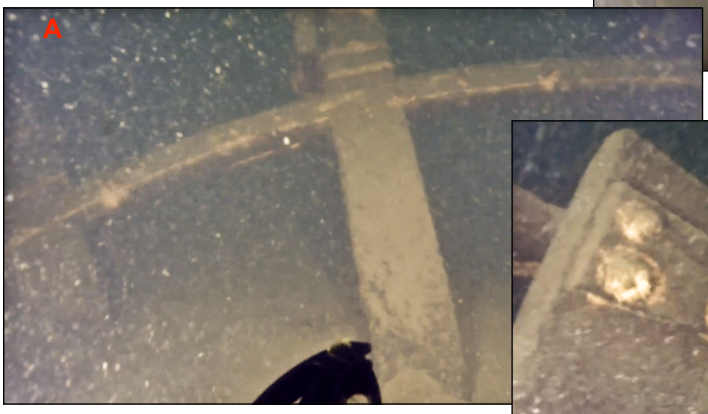
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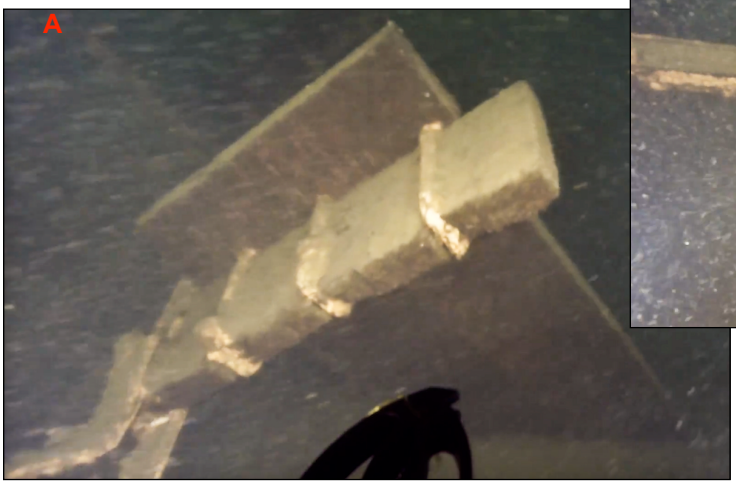
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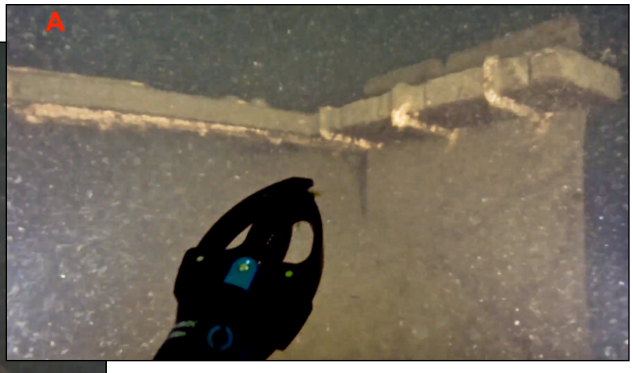
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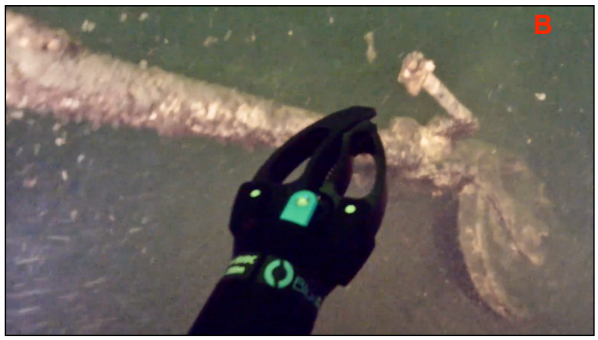
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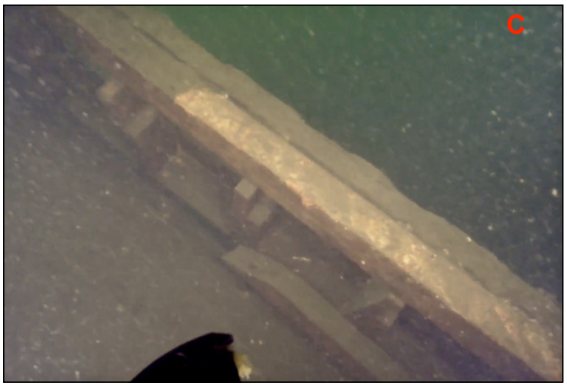
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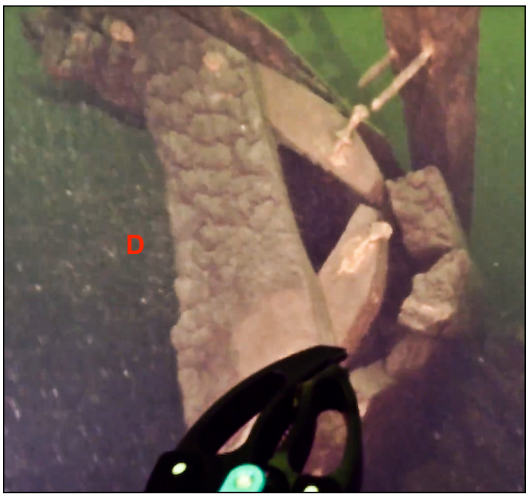
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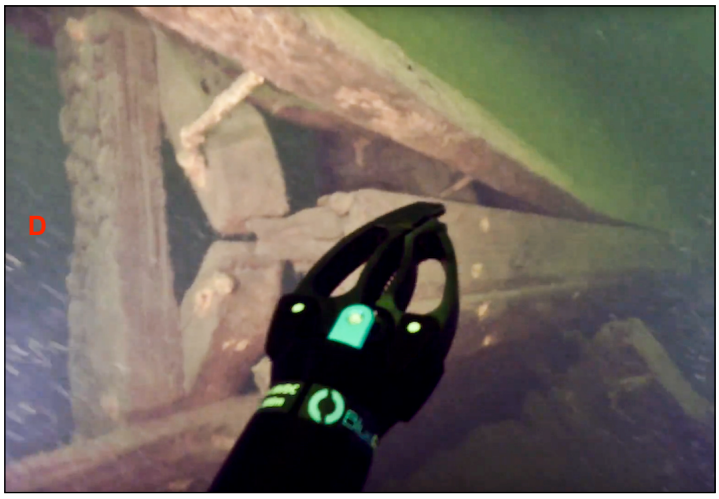
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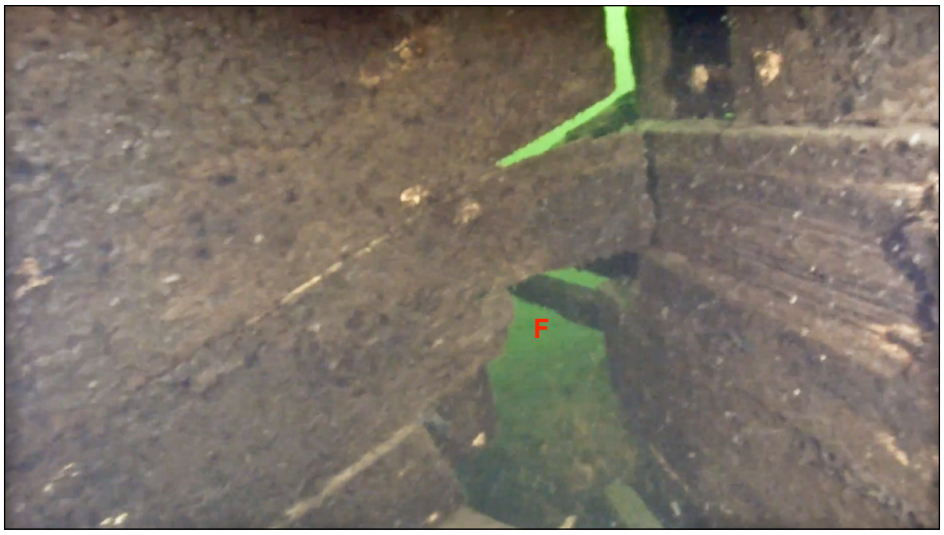
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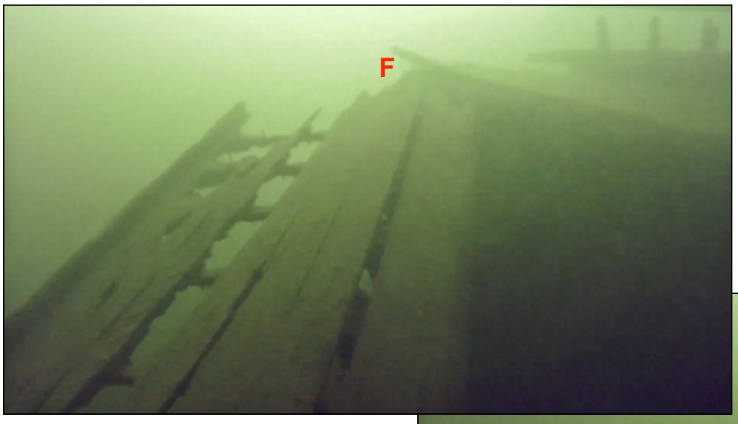
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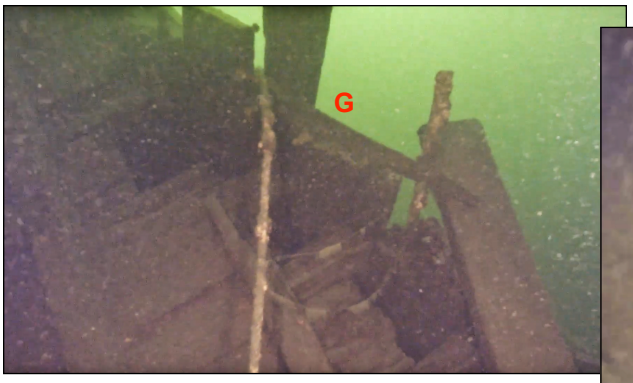
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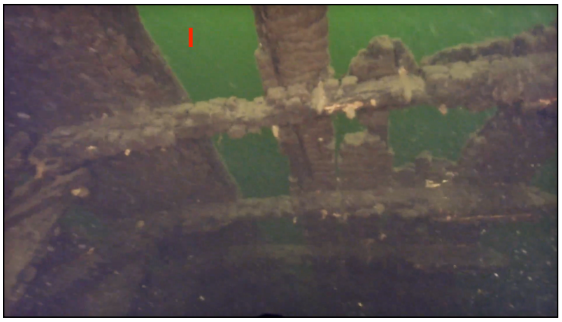
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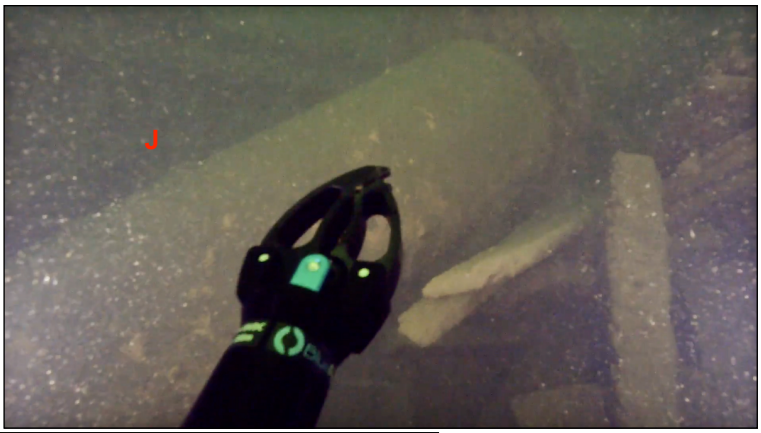
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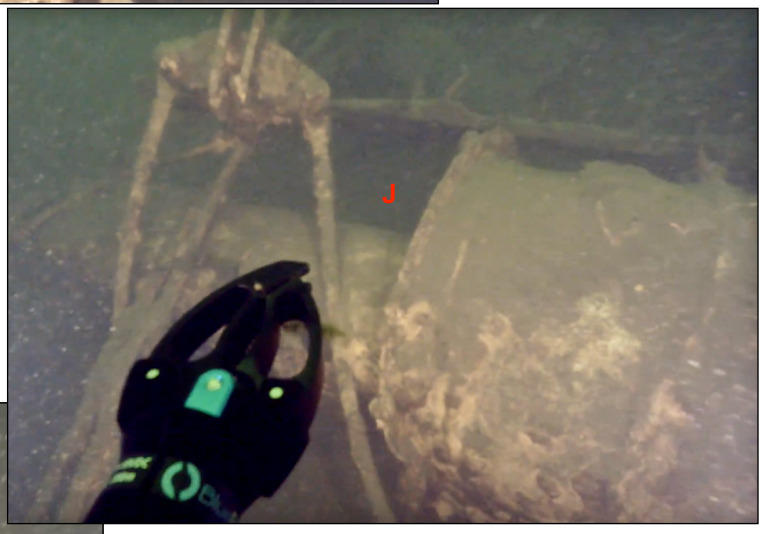
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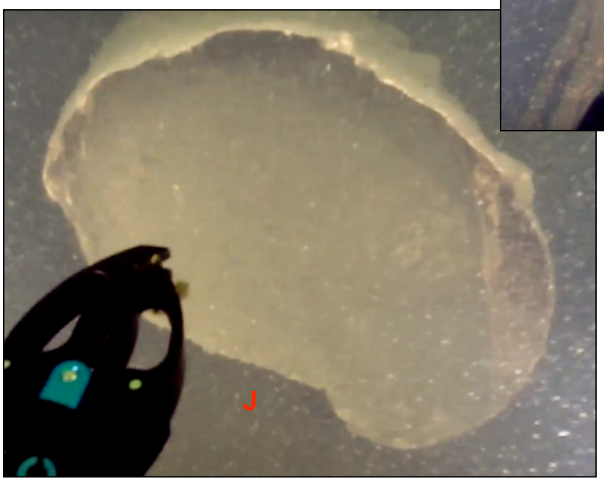
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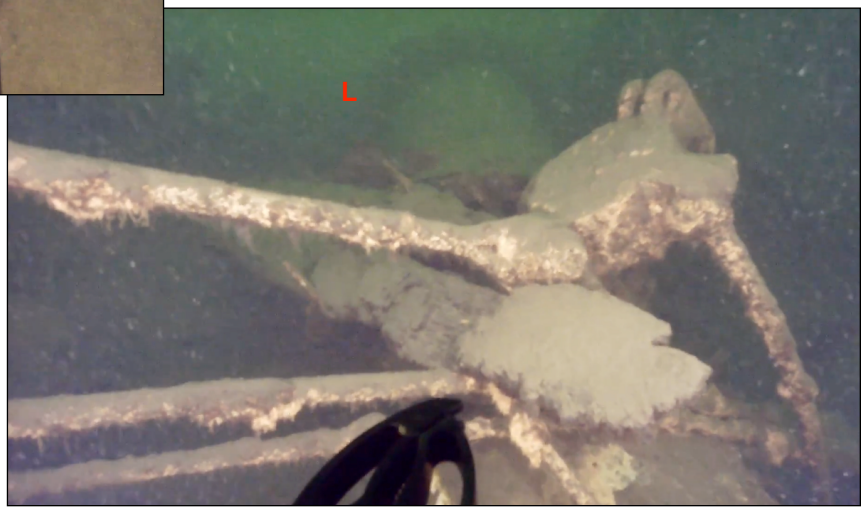
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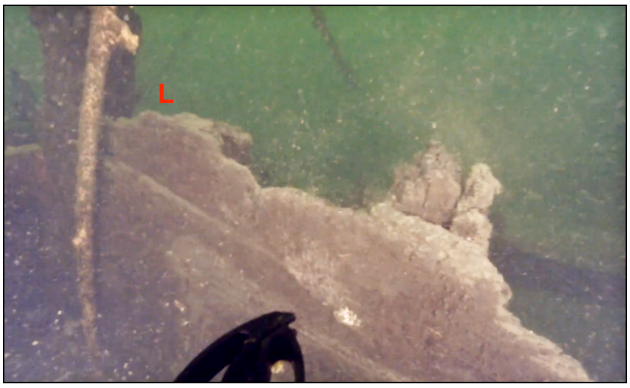
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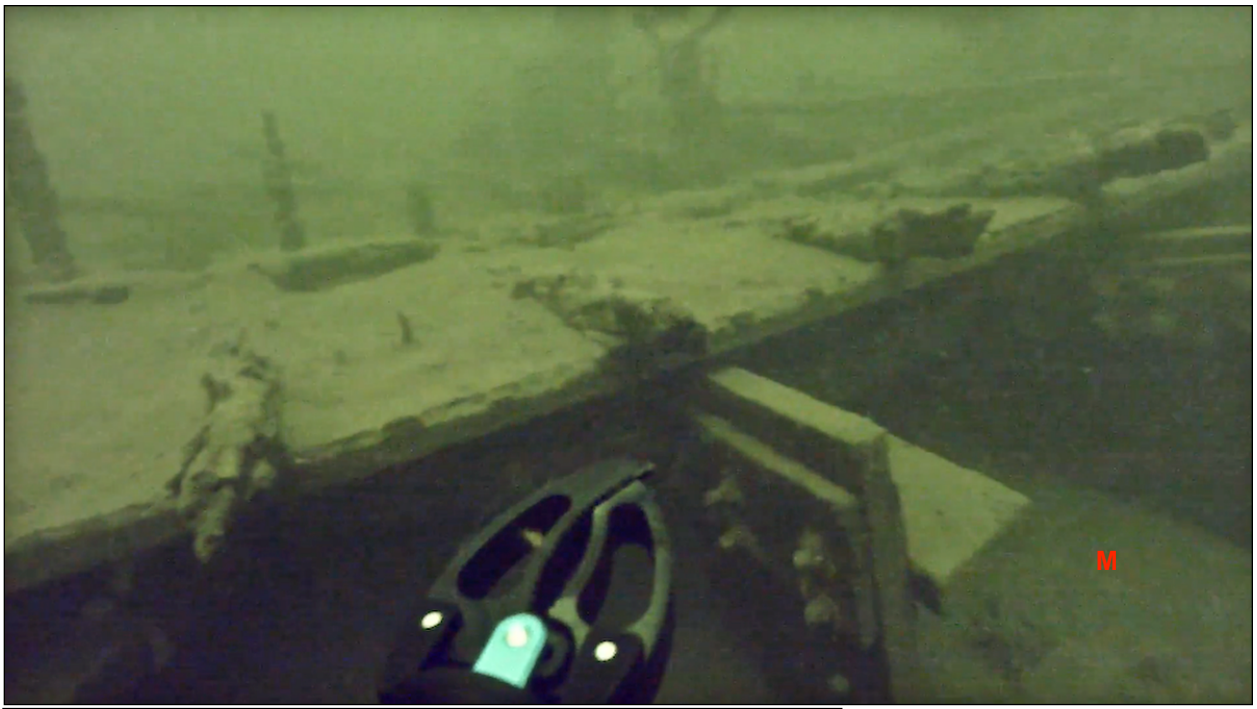
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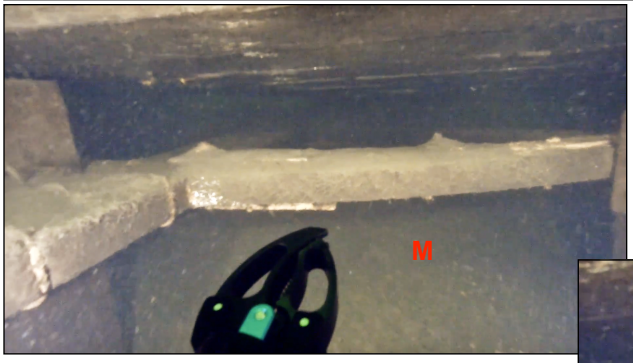
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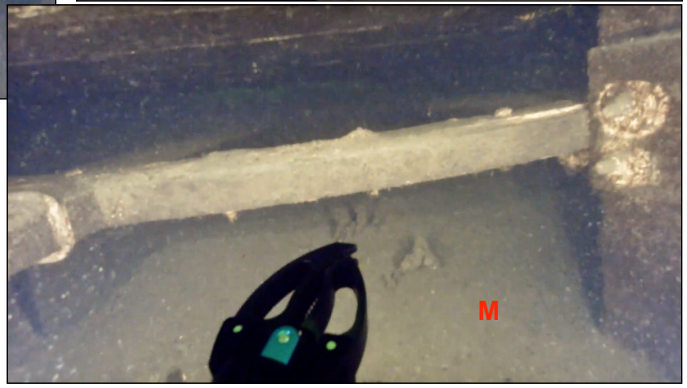
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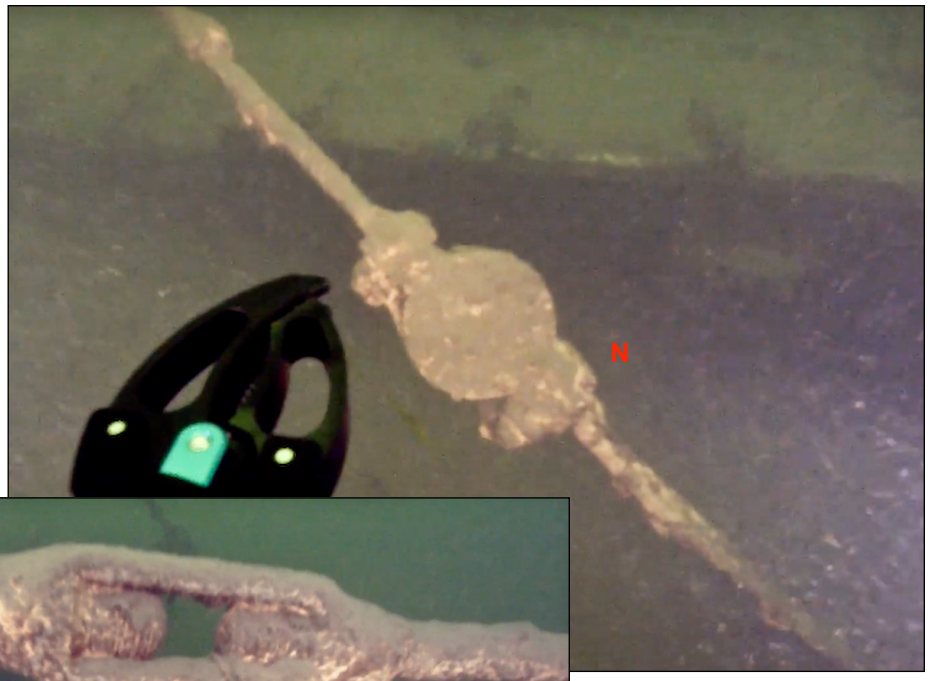
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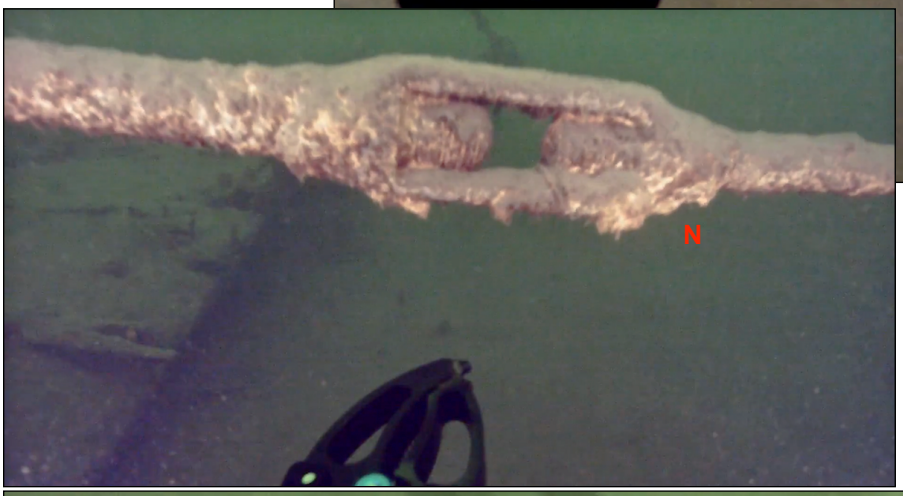
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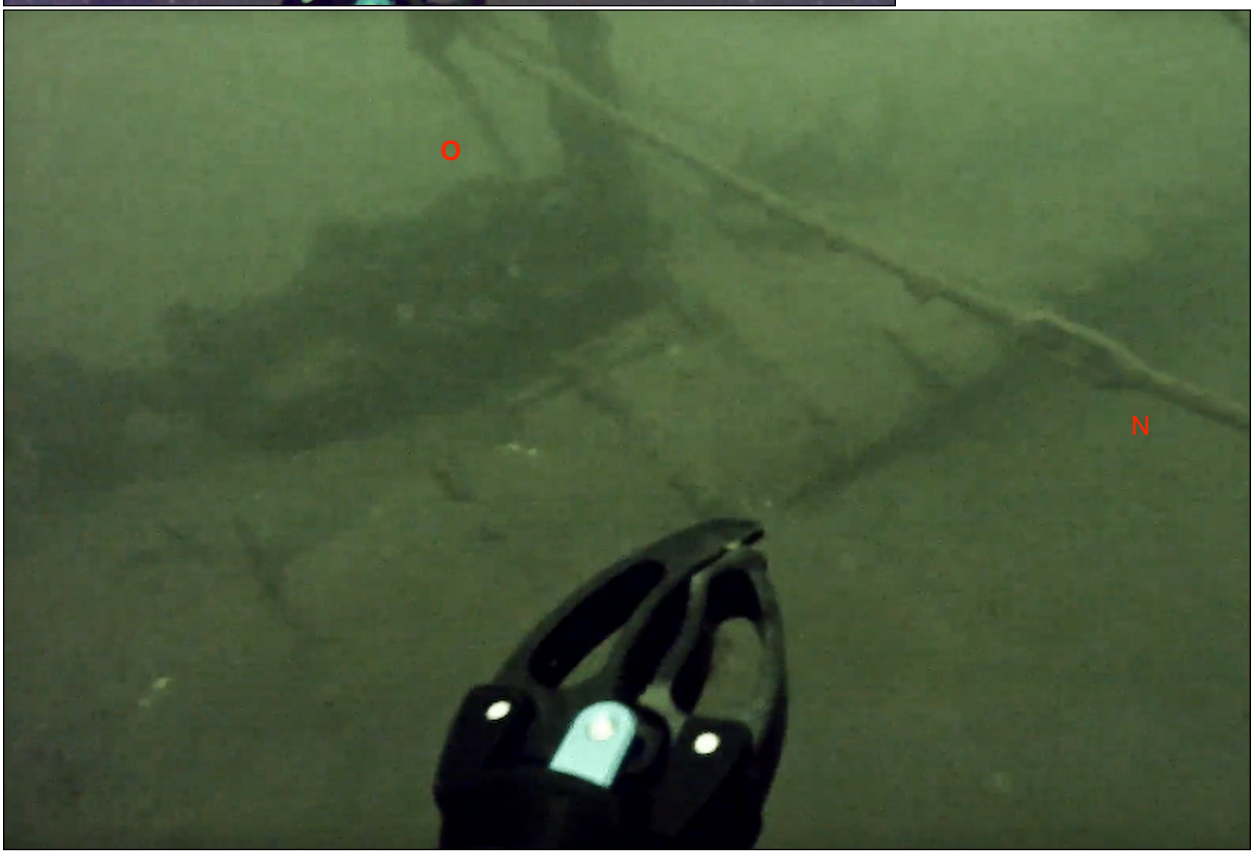
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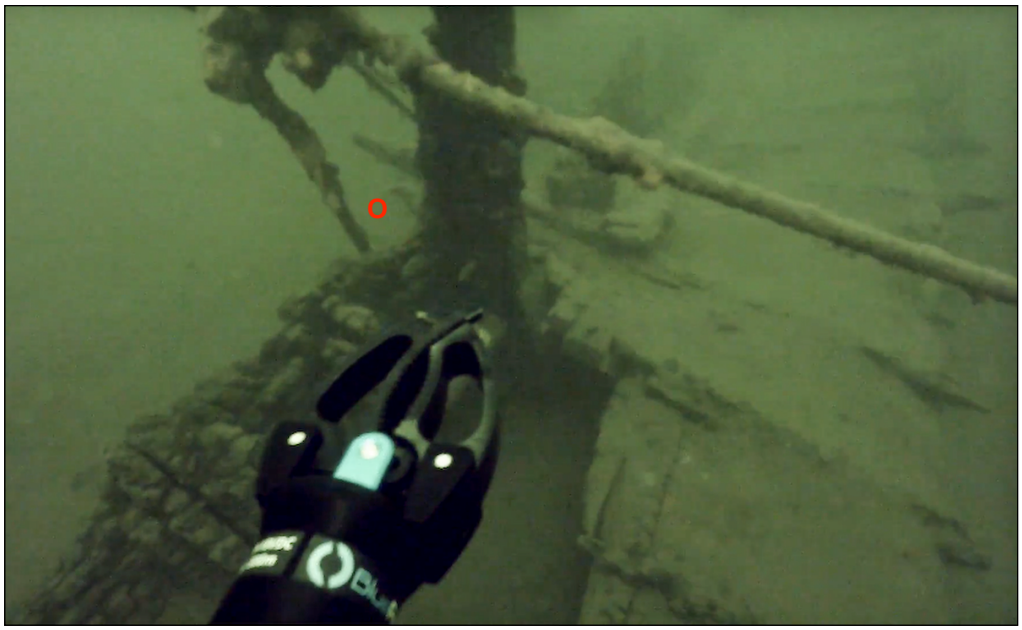
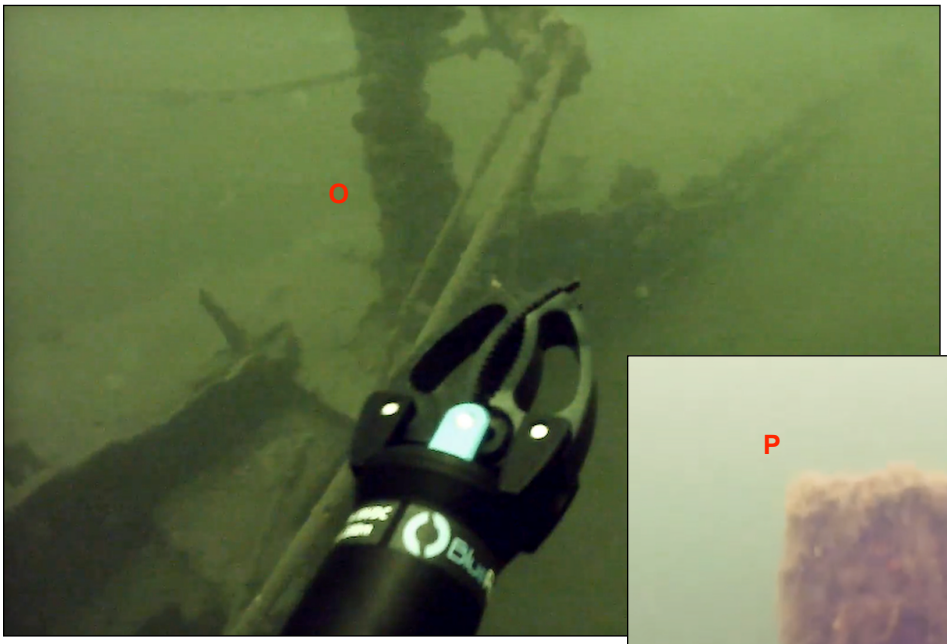
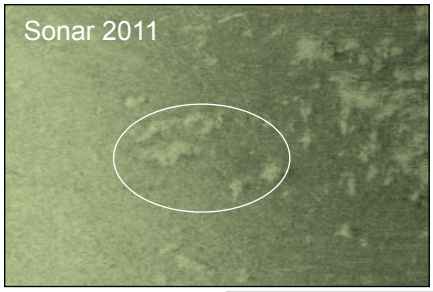


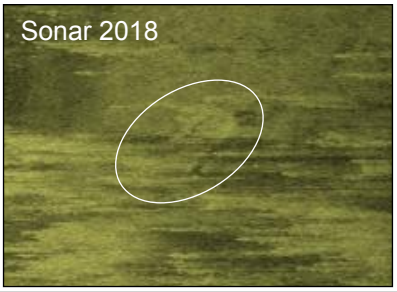



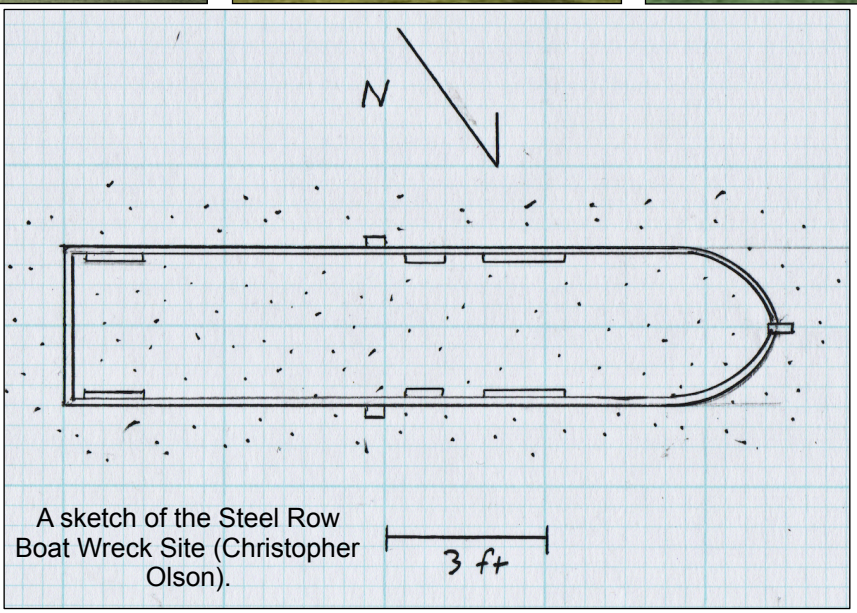
The orange buoy in the water column attached to the forward sponson.

**Steel Row Boat Wreck Site, 21-HE-530 (Anomaly 756)**

Like the Overturned Duck Boat Wreck above, sonar recorded during earlier surveys did not produce recognizable images of Anomaly 756 because of abundant weeds or lack of detail. In early May 2019, the area around the anomaly was clear enough of seasonal vegetation to allow the recognition of Anomaly 756 as a wreck. In early June, MHM determined the wreck is made of steel, is 13.30 feet long, and 2.80 feet wide in the beam. The distinguishing feature of Anomaly 756 is its bluff (widely rounded and blunt) vertical bow. The stempost rises above the bow, it has a 90 degree turn, and it terminates in a loop. The stempost may have also served as an anchor roller, towing loop, and mooring loop. A sturdy thick caprail is formed over the gunwale; it provided rigidity to the hull that is comprised of heavy, rather thick steel. Due to the narrow nature of the vessel and the lack of reinforcement at the square stern, MHM suggests the wreck is a row boat and did not carry an outboard motor. Further, a set of sturdy angle iron oarlocks amidships on both sides of the wreck are attached to the caprail and extend outward at gunwale level. Steel supports, attached to the inner hull, for a wide stern bench are extant. Forward, steel brackets for an additional seat are visible amidships, although no seats survive; the seats may have been constructed of wood. Further forward, on the starboard side, a rectangular box-like attachment is set vertically along the inner hull; this attribute could be related to another missing seat or fishing gear. The outer hull is mostly rusted with white paint surviving in spots and the inner hull appears to be un-painted. The wreck is substantially filled with silt in an amount that exceeds the nearby Fisherman's Friend Wreck 4 Site (21-HE-509); its disposition on the lake bottom has been determined to be between 1905 and 1915.






A sketch of the Steel Row Boat Wreck Site (Christopher Olson).

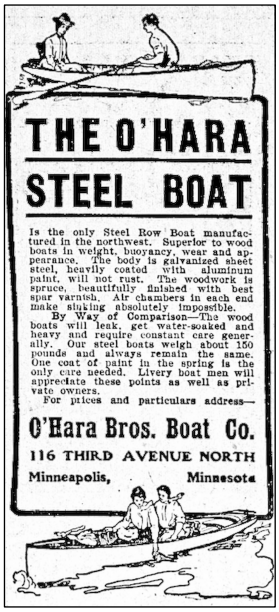
Starboard Amidships Bench Support

Starboard Quarter Bench Support

Bow

One of the earliest manufacturers of small steel boats was the W. H. Mullins Company of Salem, OH; prior to 1905, Mullins primarily constructed row boats. Also, some Minneapolis companies produced small steel boats in the early 20th Century including Pearson's of Duluth, the Minneapolis Steel Boat Company, O'Hara Brothers Boat Company, and the Sanderson Boat and Engine Company (*Minneapolis Journal* 1905; *Minneapolis Tribune* 1904; W. H. Mullins Company, 1907). MHM cannot contend that Anomaly 756 was manufactured by Mullins or one of the local companies, particularly because of its heavy construction and full bow design. Many of the early steel boats constructed by these companies emulated small wooden fishing boat designs, and Anomaly 756 does not follow this model. MHM contends the Steel Row Boat Wreck was constructed in the 1920s-1930s, and based on corrosion and silt build-up in the hull, a sinking date around 1945 is reasonable. This date would preclude the boat having a Minnesota registration number, a tracking system that began in 1959; there is no evidence on the outer hull that the vessel carried a registration number. Regardless of the estimated sinking date of 1945, if Anomaly 756 was not motorized as MHM contends, she would not have been required to register in 1959. MHM submitted an archaeological site form for the Steel Row Boat Wreck to the OSA in late-early December 2019 and received her site number, 21-HE-530, at that time.

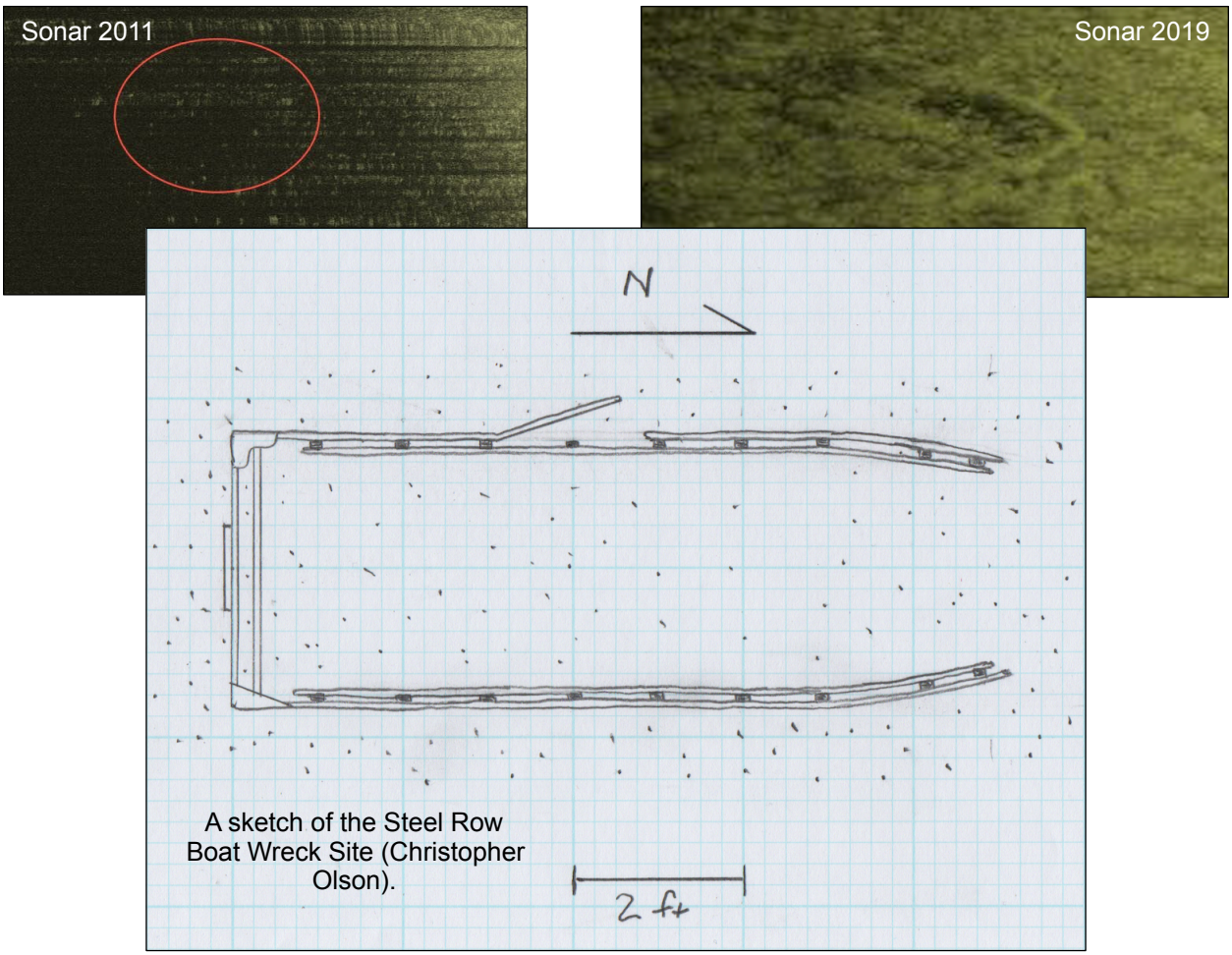
(*Minneapolis Tribune* 1904; *Minneapolis Journal* 1905; W. H. Mullins Company 1907)



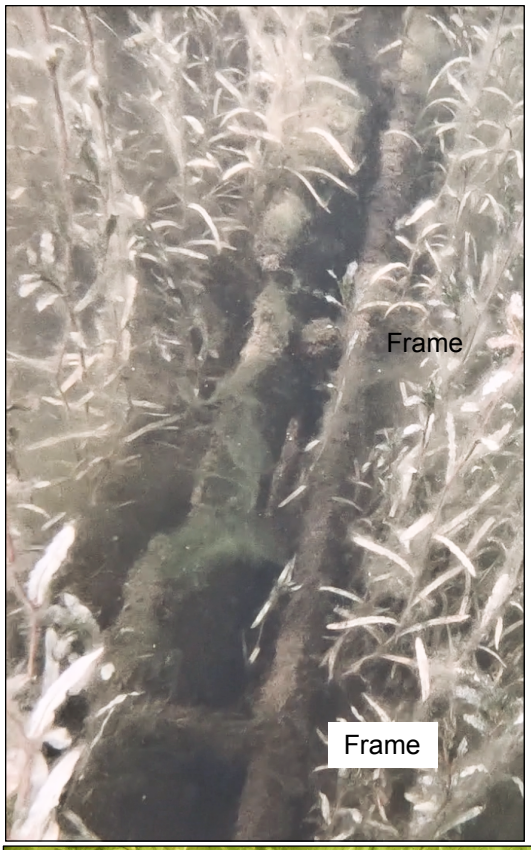
**Plywood Outboard Wreck, 21-HE-528 (Anomaly 787)**

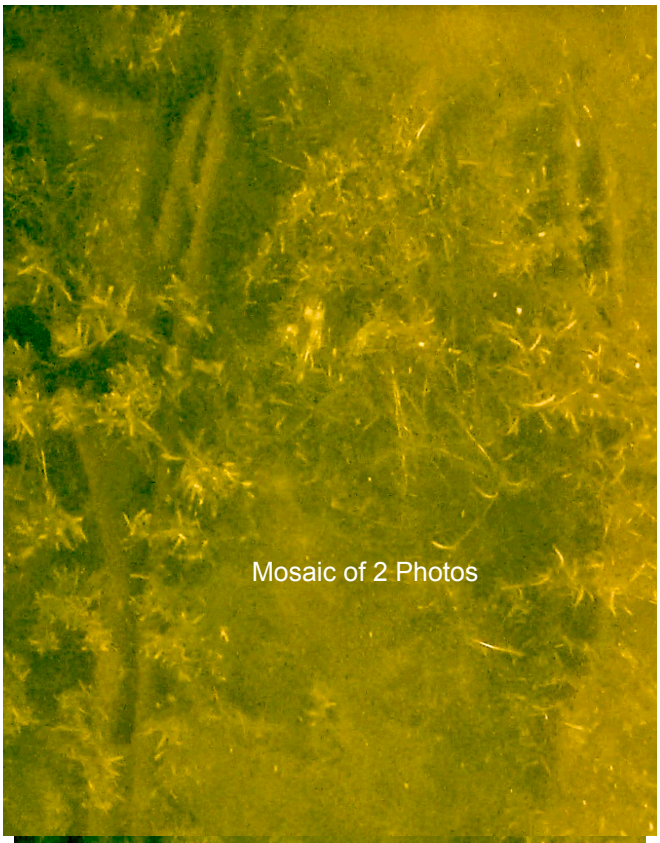
MHM recorded a recognizable sonar image of the Plywood Outboard Wreck (Anomaly 787) in May 2019 during the LMNA-9 Project; during the LMS-1 Project in 2011, the wreck could not be located within the vegetation. Currently, Anomaly 787 is 8.90 feet long and 3.30 feet in the beam and at the transom. Her bow is gone, but on both the port and starboard sides, the hull is narrowing to form the bow; originally the boat was likely 12.00 feet long. She was constructed of laminated plywood with a wide caprail and longitudinal stringer at the gunwale that survive primarily on the stern quarters. Where the caprail has deteriorated, a series of substantial frames spaced about 12.00 inches apart survive to their futtocks on both sides of the wreck; 2 longitudinal stringers are attached to the frames. The longitudinal stringers survive from the port and

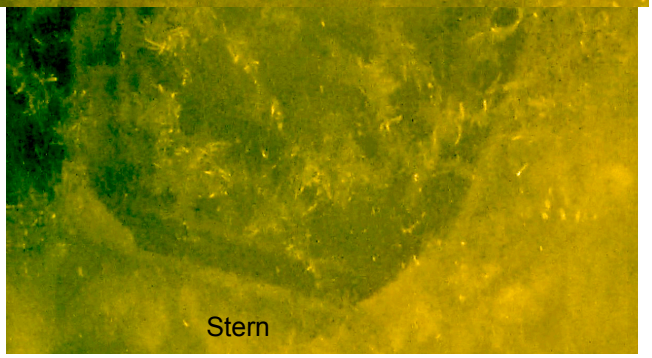
starboard quarters and extend forward to the break in the hull. The port and starboard quarters have gunwale-level horizontal knees - of 2 different designs - that provided rigidity and support. A large thick motor board is attached to the stern on the outer transom; it covers most of the stern and has a curved cut-out section at the gunwale to accommodate the outboard motor. Inside the hull, an athwartships bulwark whose ends are attached on both port and starboard parallel to the transom forms an engine/motor well; a beam is attached to the inner transom for reinforcement and strength. At this point, MHM cannot determine if the wreck was steered using a wheel or a tiller attached to the outboard motor, nor how many seats she once carried. The outer hull and gunwale was painted a vibrant blue that survives on a substantial amount of Anomaly 787; in some places, white primer or an earlier white paint layer is seen. Lastly, damage to the hull is evident due to the layered nature of plywood and its reaction to sustained submersion in water. However, the cold and fresh nature of Lake Minnetonka is slowing down the deterioration. The hull is filled with roughly 2.00 inches of gravel, and the build-up of so little sediment is not an indicator of site age but of the dynamic nature of this area of the lake; water moves through the area quickly with little material falling to the lake bottom. The Plywood Outboard Wreck is comparable in design of the Wooden Outboard Utility Wreck (21-HE-491), also on the bottom of Lake Minnetonka. With this comparison, MHM contends Anomaly 787 was constructed in the 1920s and sank around 1945. MHM submitted an archaeological site form for the Plywood Outboard Wreck to the OSA in mid-December 2019 and received her site number, 21-HE-528, at that time.



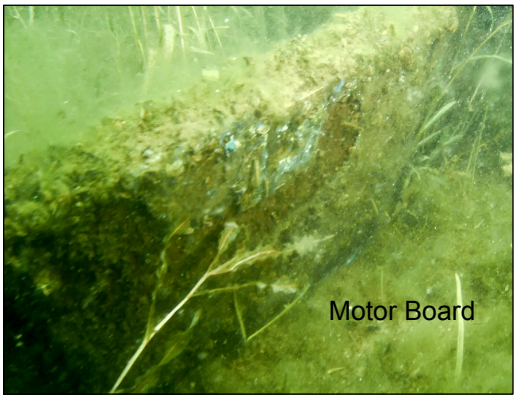

A sketch of the Steel Row Boat Wreck Site (Christopher Olson).

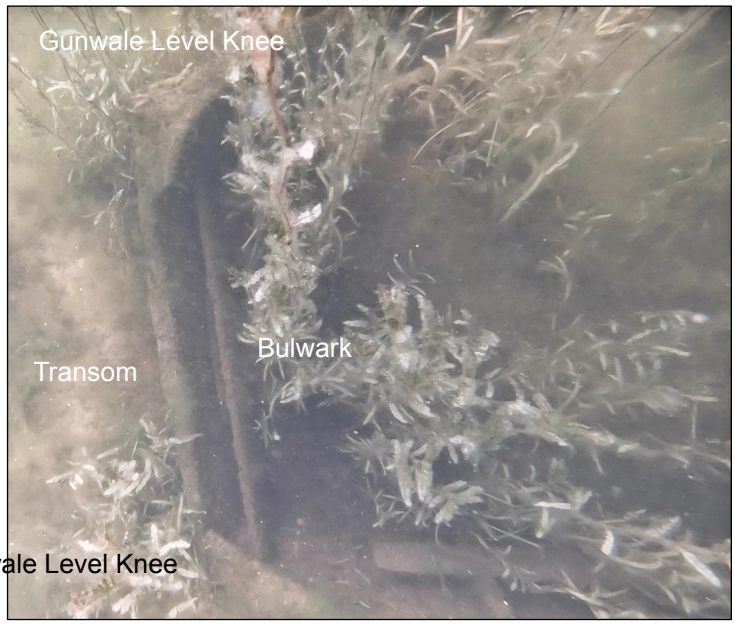





Photographs by MHM, Josh Knutson, and Kelly Nehowig



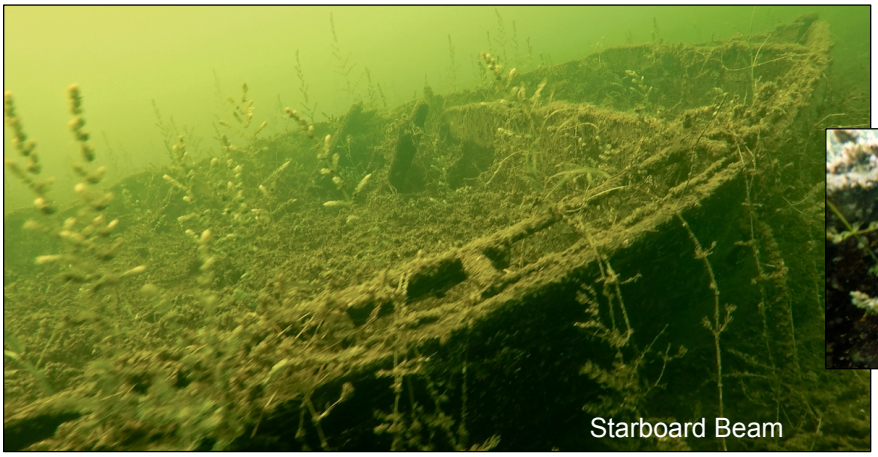



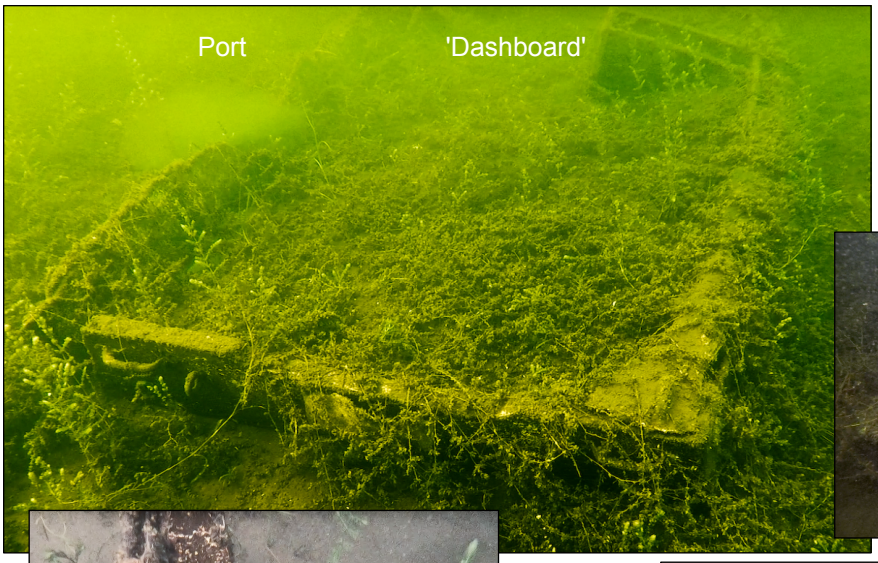
**Fiberglassed Plywood Outboard Wreck ('Shan' Wreck, Anomaly 764)**

MHM recorded a recognizable sonar image of Anomaly 764 in May 2019 during the LMNA-9 Project; previous scans did not allow for the identification of the wreck. In May and July 2019, MHM investigated Anomaly 764 and determined she is a small plywood wreck sheathed in fiberglass. The wreck is 13.30 feet long, 5.10 feet in the beam, and 4.20 feet at the transom. She has a flat bottom and a hard chine that can be discerned on the starboard side bow and inside the port bow. Her broad bow is pointed with an inner support and block that may have acted as an anchor roller; a towing loop is attached below the gunwale. Anomaly 764's gunwale has survived but it is damaged on the port side amidships and aft, with evidence of burning; MHM contends there was an electrical fire at this point. The wreck has a wooden rub rail, and a wide, flat, thin, white caprail on the starboard quarter to amidships. The caprail is a layer of plywood veneer and it has a metal cleat and metal flag or banner staff holder attached to it. Under the surviving caprail, a gunwale-level stringer runs along the length of the wreck on both starboard and port; they slot into a cambered deck beam near the bow. The stringer is attached to a series of frames fixed to the hull with their thin edge to the hull; 3 of these frames have loosened on the port side amidships. Other small blocks affix the stringers to the gunwale at various locations. The deck beam that supports the stringers is notched into the starboard gunwale and knotted line is tied to it; it disappears into the silt next to the wreck. A 2nd, shorter deck beam is set forward. MHM contends these 2 deck beams supported a forward deck that is no longer extant, and the cambered design of the larger beam supports this hypothesis. The transom is square with a cutaway in the center at the gunwale for an outboard motor. The inner transom has an affixed layer of plywood veneer that acts as a motor board and the fiberglass sheet on the outer transom amidships has been loosened. The stern also has 2 metal carrying handles and 2 tie-down loops attached to it. On the starboard stern quarter, a gunwale-level triangular knee provided rigidity to the wreck and support for the wide veneer caprail. A hull break at the port stern quarter and transom junction is the only major structural damage evident on the wreck - and the triangular horizontal knee like the one found on the starboard side is missing. Also on the port side quarter, about 3.00 feet from the stern, one of the futtocks has a steering cable passing through it, heading to the missing outboard motor. On the starboard side amidships, 7.30 feet from the bow, a rectangular structure that is solid on its forward side and supported by a stanchion and the hull side on its aft side, is found. MHM contends the rectangular 'box' is essentially a dashboard that once held the steering wheel.

(Mark Slick)

Photos by MHM volunteers Kelly Nehowig and Mark Slick.





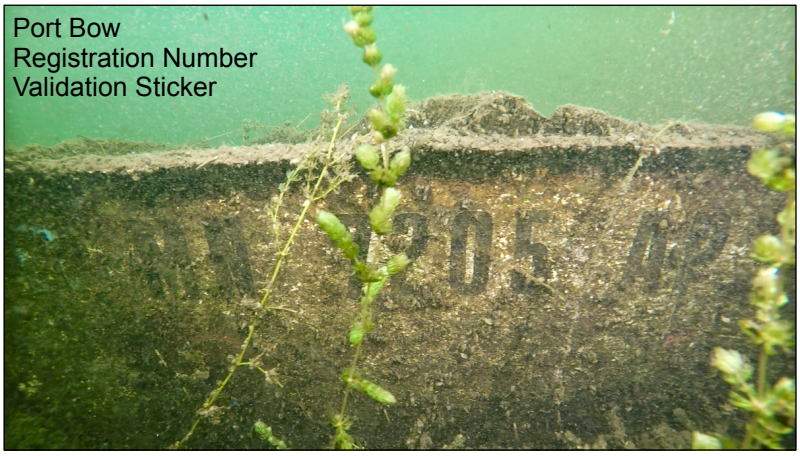

Photos by Kelly Nehowig and Mark Slick

White Wide Starboard Quarter Gunnel

Anomaly 764 has been painted and repainted several times, with blue, red, and white paint seen all over the wreck. The fiberglass covering the plywood is in decent shape around the wreck, although threads of the fabric can be seen in places. The inner hull appears to have been primarily painted or primed with white, and some fiberglass may have been folded over the gunwale and affixed to the inside hull. Anomaly 764's Minnesota registration number is MN 7205 AP, a number assigned in 1959; it survives on both the port and starboard side bows. Next to the registration number, the remnants of a blue Minnesota validation sticker - for the years 1971-1972-1973 - on her port side survives. According to the DNR, the last validation linked to MN 7205 AP expired in December, 1976 (John Nordby, personal communication, June 2019) and it was red, not blue; the 'missing' red sticker was placed over the blue sticker, but it has since worn off.

In terms of Anomaly 764's construction date, DNR records indicate she was constructed in 1959 (John Nordby, personal communication, June 2019), and this information may be accurate. However, it also may simply reflect that the boat was registered during the first year of watercraft registration in Minnesota. MHM has encountered historical registration information that is erroneous or misleading, so Anomaly 764 may have been constructed prior to 1959. DNR records also list her as a 'Shan' model boat; MHM does not know what this designation refers to in relation to boat building companies. However, there is a 'Shain Manufacturing Company' in Seattle that constructed yachts for decades; whether the company built small plywood boats is unknown. MHM contends the boat was constructed in 1959 or in the decade prior to that date, and she was fiberglassed later in her working life to prolong her time on the water. She was scuttled sometime around 1976, with her seats, outboard motor, steering gear, and

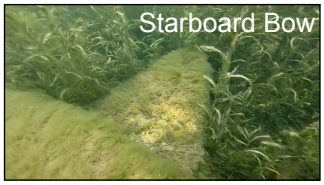
steering wheel removed prior to her sinking - possibly after receiving fire damage on her port side. The Fiberglassed Plywood Outboard Wreck cannot be categorized as an archaeological site at this time, but she is a State and Federally protected maritime historical resource.



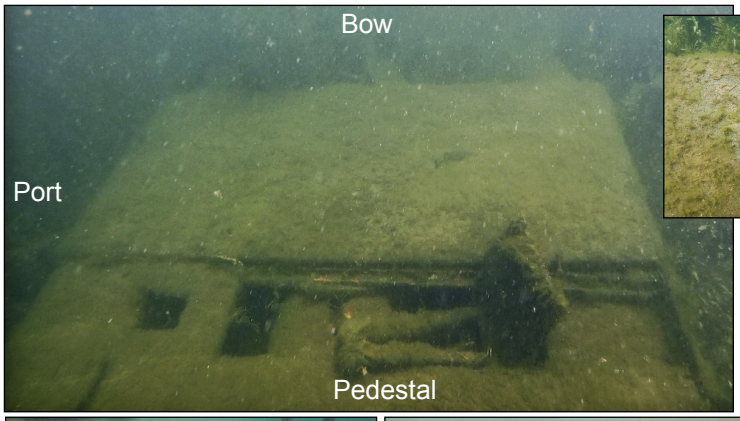

Left: Red paint and fiberglass threads on the port bow.
Photographs by Josh Knutson and Mark Slick

**Triple Pontoon Boat Wreck Site (Anomaly 757)**

MHM recorded a sonar image of the Triple Pontoon Boat Wreck (Anomaly 757) during the LMS-1 Project in 2011 that was not recognized at the time. Upon recent reviewal of the footage, an outline of the wreck can be discerned in the weeds, but it was missed among the lake's vegetation; the signature resembled hundreds of other variations in sonar transects recorded over the years. In May 2019, during the LMNA-9 re-scanning of shallow areas of Lake Minnetonka, MHM recorded a detailed sonar image of this large wreck. Anomaly 757 is 35.40 feet long at her 2 longest pontoons and 12.00 feet in the beam, measured at the deck. The longest pontoons are on port and starboard, with a shorter central pontoon between them. The ends of the pontoons at the scow (square) bow - in plan view - are trapezoidal in shape. The scow stern has a raised gunwale and a large wedge cut out at the midline - a motor well - would accommodate outboard motors. Carpet is attached to the wreck at the stern, flapping loose around the motor well. It appears the carpet shifted from the port quarter deck; white paint is seen there on exposed plywood. Also on the port quarter, blue and red paint are evident, and in the motor well, blue and white paint (or primer) is seen. The port and starboard pontoons at the stern - in plan view - are rectangular and in cross section, they are square. Metal brackets attach the pontoons to the plywood deck at the stern. At the port quarter, a rectangular frame with cross-braces stands on edge on the lake bottom. Forward, a rectangular piece of plywood lies next to the hull; it may have been a hatch of sorts.

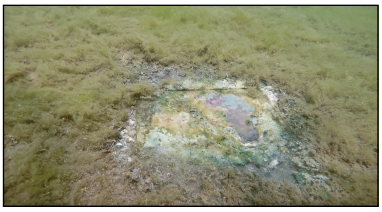



The wreck's deck overhangs the pontoons on port and starboard, and is a nearly rectangular wooden platform with scow ends; it tapers slightly at the bow and the forward corners are rounded. A sturdy rubrail survives on the starboard bow and port quarter, and it is detached from the port side in places, sitting next to the wreck. Toward the bow, a large and heavy metal deck fitting - a pedestal - on the starboard side deck has toppled over toward the wreck's centerline; it took a section of the deck with it. Currently, the fitting is lying on the middle pontoon since the deck is missing at that point. MHM contends the fitting is the base for a winch or similar work boat attachment. Two U-shaped metal deck beams span the beam where the decking is gone. Further to port, a small square hatch was placed and on the port side just aft of the hatch, a longitudinal deck stringer - its purpose unknown - is attached to the deck. On both port and starboard, metal pipes or conduits go through the deck and are bent upwards into the water column. Also, another break in the decking is located toward the stern; a rectangular section is missing that spans the entire beam. Like the forward through-deck section, probable steering cables are evident and the 3 pontoons are seen.

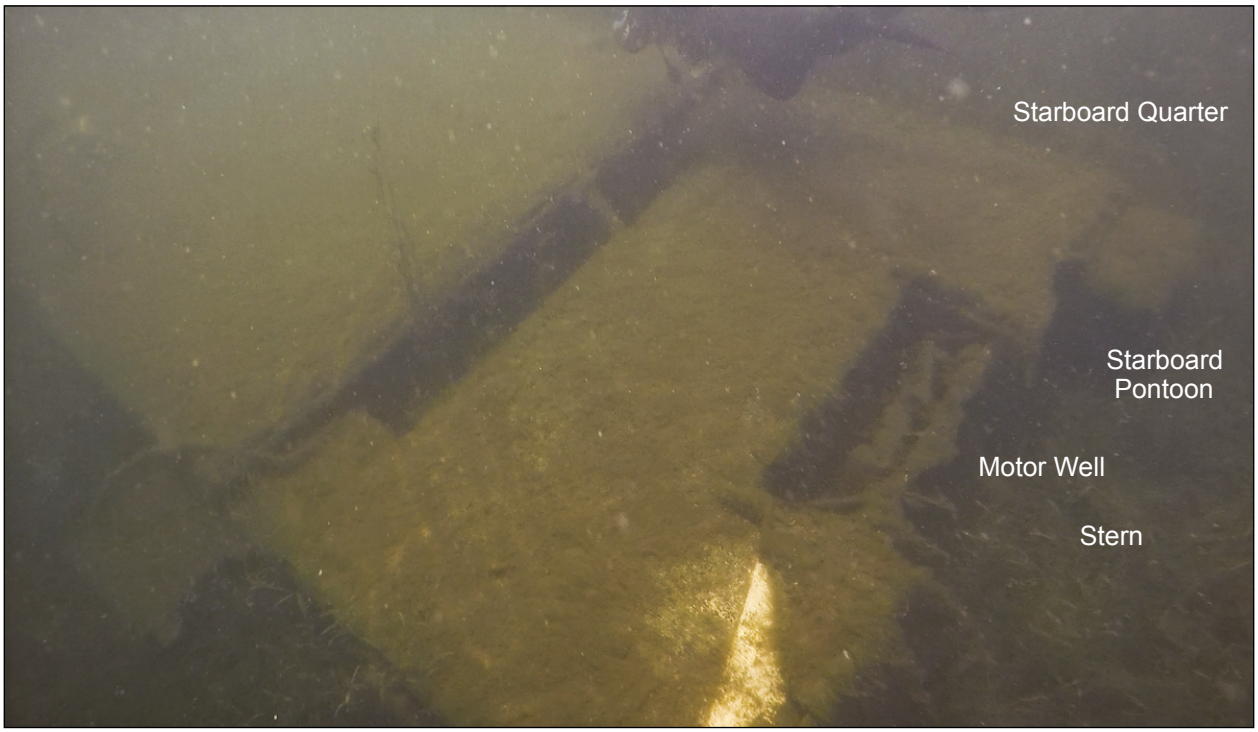


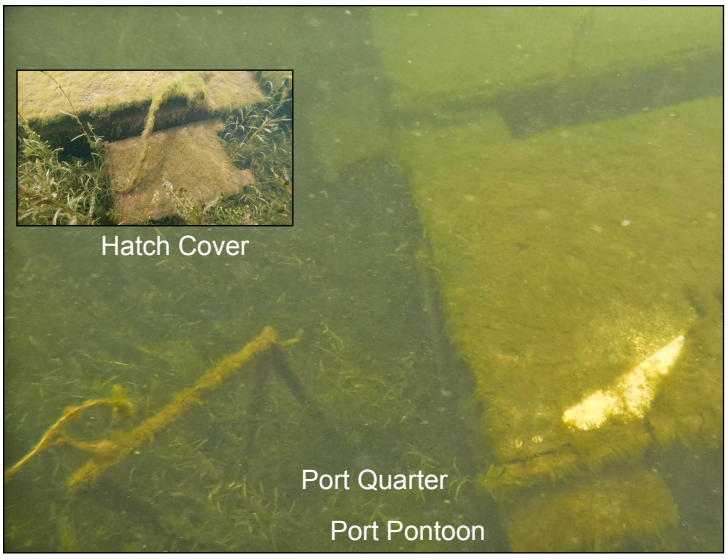
Photographs by Kelly Nehowig, Nick Nothom, and Mark Slick

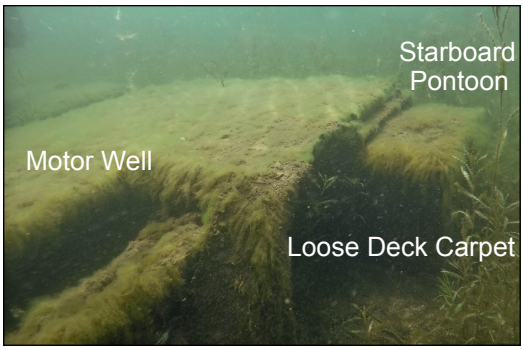
Photographs by Kelly Nehowig and Mark Slick

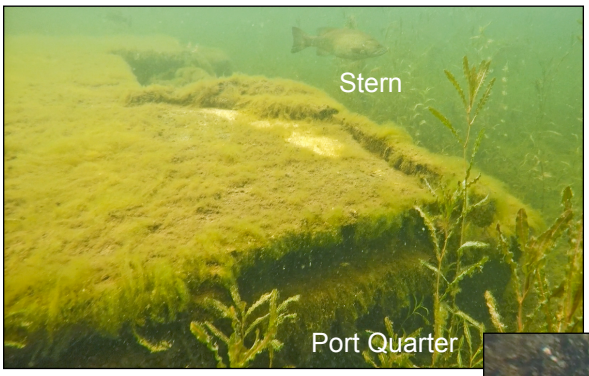


Underdeck Cables



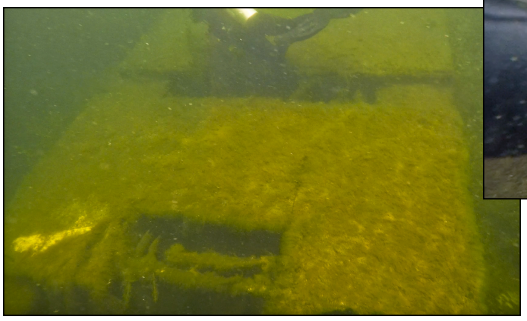





The inside of the Motor Well is painted bright blue and white; some loose carpet must be moved to reveal the painted wood.

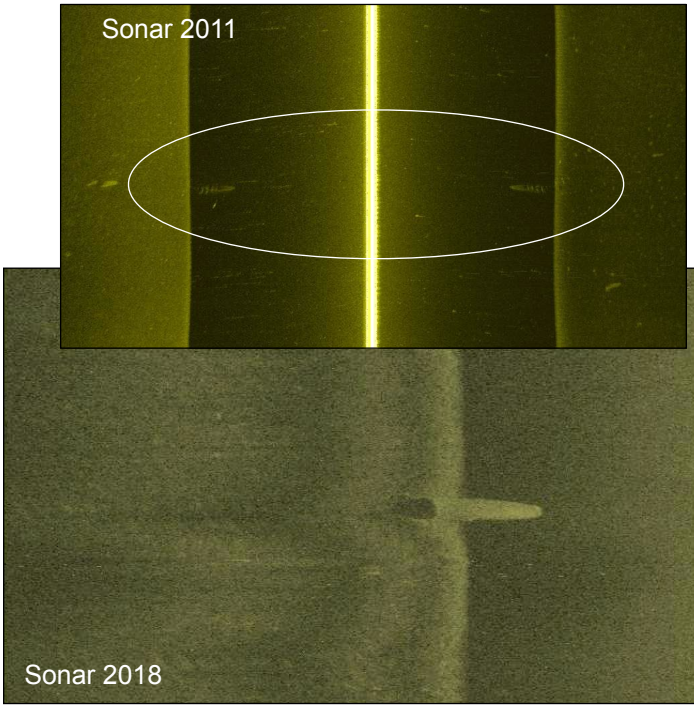
Photographs by Kelly Nehowig and Mark Slick



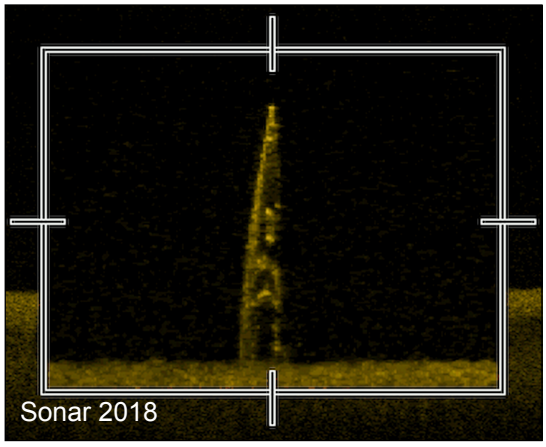
The Triple Pontoons Boat Wreck has been on the lake bottom for decades and no registration number is evident on her pontoons or deck. Based on the design of the pontoons, she was constructed after the mid-1950s; before that date pontoons were usually comprised of 55 gallon drums. MHM contends that Anomaly 757 was a workboat as indicated by the metal winch pedestal, her sturdy construction, and the presence of a 3rd pontoon. The Triple Pontoons Boat Wreck cannot be categorized as an archaeological site at this time, but she is a State and Federally protected maritime historical resource.

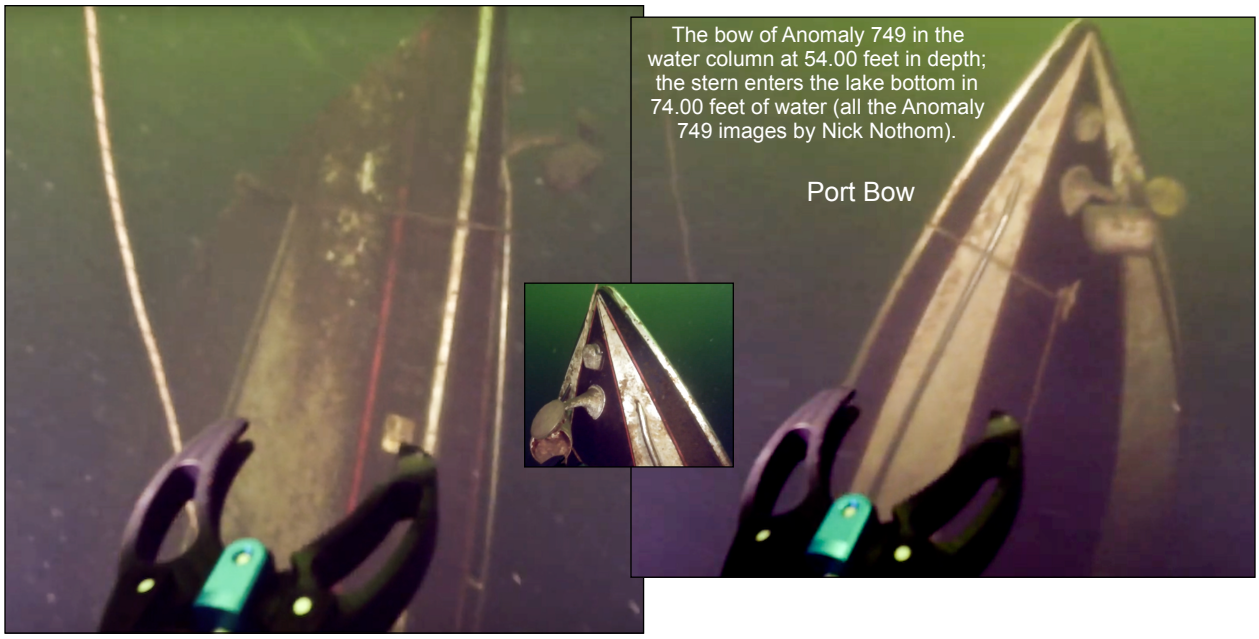
**Upright 1986 Chris-Craft 260 Stinger SL LTD Wreck Site (Anomaly 749)**

During the LMS-1 Project in 2011, MHM passed directly over Anomaly749 and recorded a barely distinguishable sonar image of it that was not readily recognized. In August 2018, MHM recorded a detailed image of the anomaly using improved sonar equipment. The object was standing vertically in the water column, deck details were discerned, and it had a pointed end. MHM investigated Anomaly 749 in cooperation with Nick Nothom of Digilabs using an ROV in late June 2019. The ROV encountered the anomaly at a depth of 55.00 feet; the bow of a large fiberglass boat rose into the water column 20.00 feet. Clearly evident on the wreck's bow is the registration number MN 6209 FG and a square 1990 year validation sticker. According to DNR records, the wreck is a 26.00-foot long 1986 Chris-Craft whose registration expired in December 1990. The long nose of the wreck has a navigation light and spotlight at the pointed bow, with a lifting eye just aft. A towing line is wrapped around the lifting cleat and to the bow towing loop, and it travels all around the wreck, including along the bottom of the hull, around the open cuddy hatch, over the windshield, around the raised light mast, and to the stern. The line is very long and shifts around the wreck with water movement; its end rises into the water column about 10 feet above the wreck. The towline ends in a sharp cut with 2 zebra mussels attached to it. The wreck's Danforth anchor is also tangled in the towline; the exact location of the anchor line isn't known, but the anchor chain is evident. The boat's cover pieces are present and in place, attached to the wreck and each other by snaps and zippers. Visible through the front of the windshield, the back bench cushion has detached and its buoyancy pushed it forward. Also seen through the windshield, the small 'door' to the cuddy found port of the steering wheel is opened toward the windshield, assisted by gravity. Toward the stern, about 6.00 feet of the wreck is imbedded in the lake bottom, including the heavy engine or engines that allowed for Anomaly 749 to sink stern first. The wreck's hull is white, her bottom is black, and her Imron paint design black and orange bands and stripes (Murray Chris-Craft Sportboats, Inc. 1985, 10).

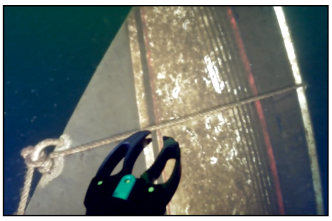


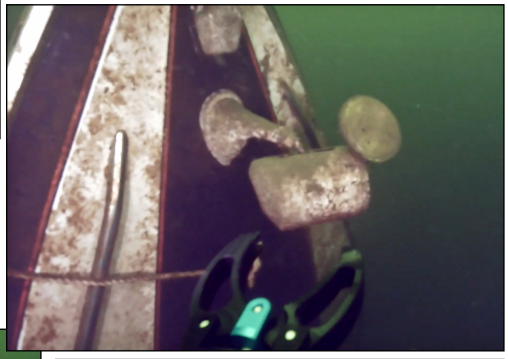

Deeper anomalies often appear in the down image of sonar footage - and they are 'cut in half'. That is the case with Anomaly 749 when she was first recorded in 2011. Because of the faint nature of the image, MHM did not recognize the anomaly until later sonar review in 2017. Targeted sonar surveys in 2018 with improved sonar equipment recorded detailed images of the wreck.

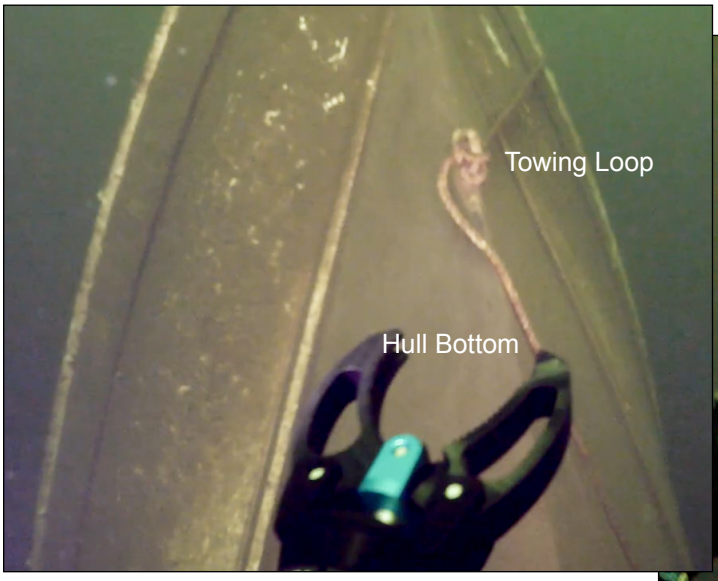




MHM contends Anomaly 749 was under tow when, for unknown reasons, she began to sink and her towing line was cut. It is possible that her hull plug was not inserted, her outdrive boot was damaged, or some other through-hull fittings leaked or are missing. Evidence on the wreck - the registration number and validation sticker - confirm the records held by the DNR: Anomaly 749 is a 1986 26.00-foot long Chris-Craft and she sank prior to December 1990 (John Nordby, personal communication, June 2019). Further, MHM surmises the boat was first registered in Minnesota in 1988 since registrations covered 3 years: 1988-1989-1990. Or, she was a 1986 model purchased in 1985, and her first validation sticker would have covered 1985-1986-1987. Through research, MHM has determined that Anomaly 749 is a 260 Stinger SL Limited (LTD) due to the wreck's length and hull markings. In 1986, Chris-Craft offered the 26.00 Stinger as an SL or SL LTD model. The boats were identical, but a buyer was offered a choice of hull paint designs when purchasing the SL LTD and the 'LTD' badge would appear on both sides. Anomaly 749 - considered a 'Sportboat' - was constructed in Bradenton, FL. In 1986, about 97 Stinger 260 SL (including LTDs) models were fabricated. One detail MHM cannot determine at this time is whether the wreck carries a single engine or twin engines. The twin engine models were clocked at speeds near 60 mph. The Stinger 260 models were popular in the mid-1980s because "Miami Vice's" Crockett and Tubbs fought crime in a Stinger 390X. The 260 models were easier to trailer because of their smaller size and were more 'affordable'; a base model single engine Stinger 260 listed for $39,795 and a twin engine base model sold for $48,595 (Murray Chris-Craft Sportboats, Inc. 1986; Rodengen 1993, 243; Woodyboater 2015). The 1986 Chris-Craft Stinger 260 SL LTD Wreck cannot be categorized as an archaeological site at this time, but she is a State and Federally protected maritime historical resource.



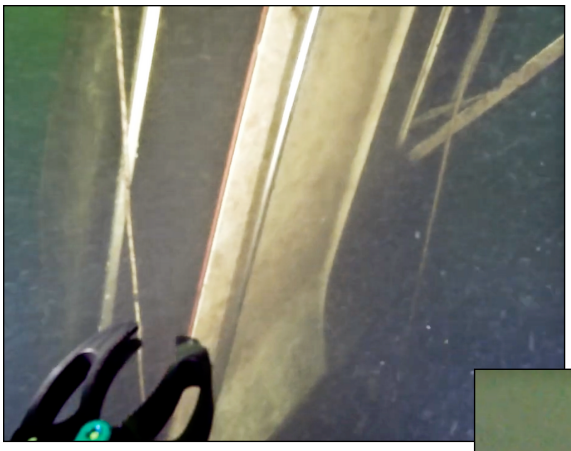


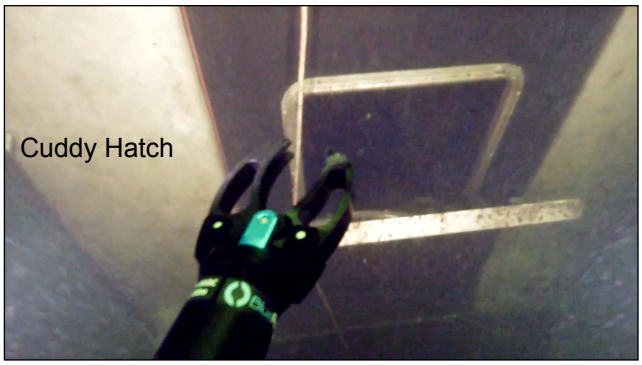


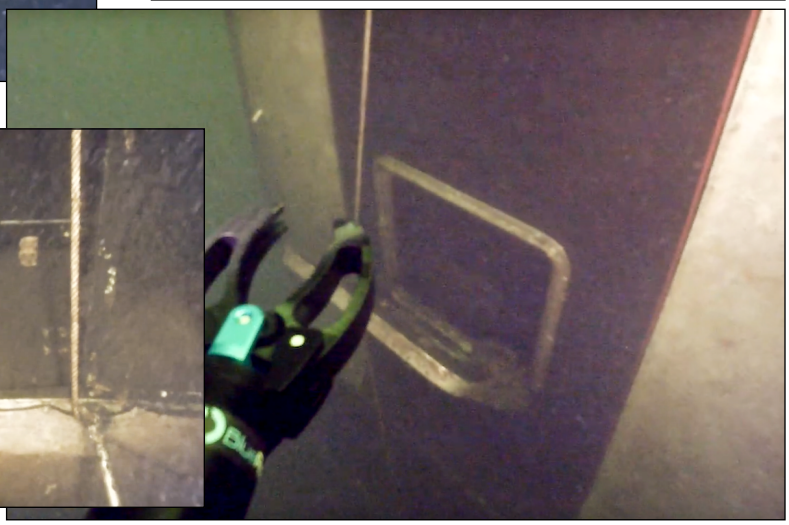
Port Beam

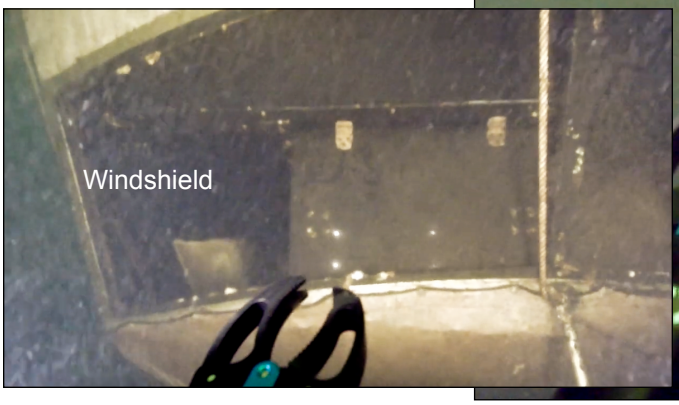
Starboard Beam

Starboard Beam







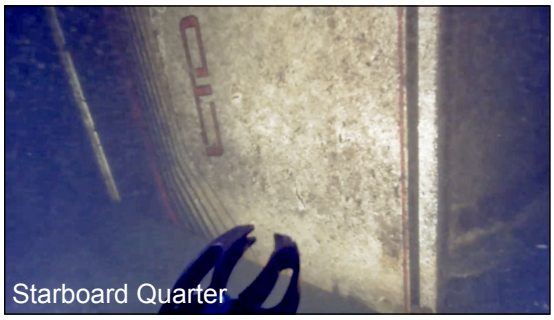
Boat Cover and Mast Light

Loose Stern Cushion

Boat cover pieces zipped together and snapped onto the hull.

Port Quarter

Stern into the Silt


Starboard Quarter

Hull Bottom into the Silt

Port Quarter

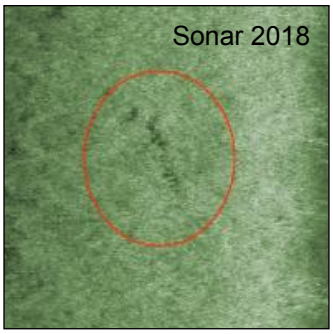
Hull Bottom into the Silt

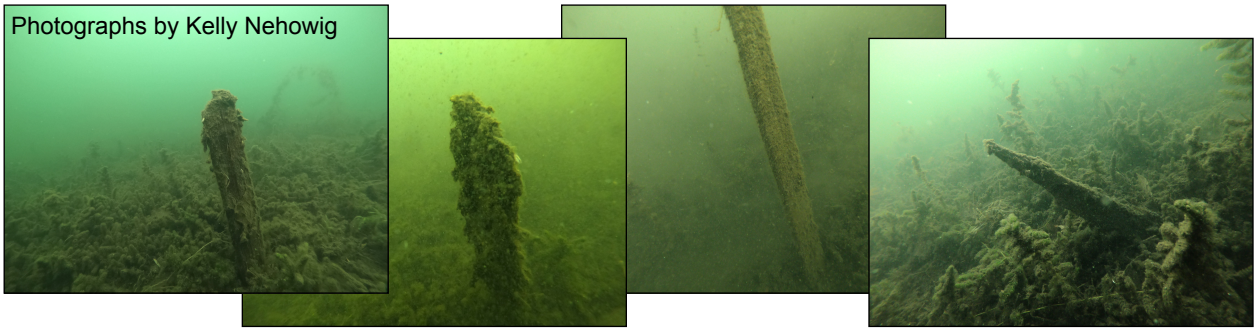
The stern of a 1986 Chris-Craft Stinger 260 SL LTD. The last 6.00 feet of Anomaly 749, that cannot be seen under the silt, resembles the image below.

A 1986 Chris-Craft Stinger 260 SL LTD. This boat is identical to Anomaly 749 in appearance, except for the color.

**Dock Piling Remains (Anomaly 755)**

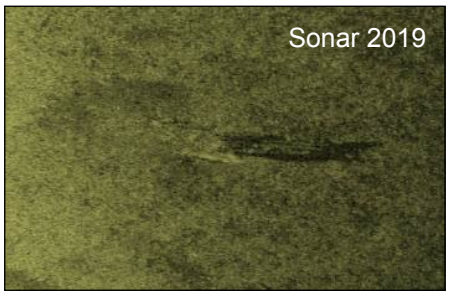
MHM volunteer Kelly Nehowig identified a few wooden pieces imbedded in the lake bottom in 2018 during a SCUBA reconnaissance. MHM dove on Anomaly 755 in late May 2019 and it was determined that the wood represents the remains of a dock; they are pilings placed into a line. The Dock Piling Remains is a protected submerged maritime cultural resource.




**Lifeguard Tower (Anomaly 740)**

MHM recorded clear sonar images of Anomaly 740 in May 2019. In mid-June, MHM dove on the anomaly and determined it is an wooden lifeguard tower on its side with bits of rope attached to it. It has been on the lake bottom for decades, but a precise date cannot be determined at this time. The Lifeguard Tower is 7.00 feet long and 4.00 feet wide and is a protected submerged cultural resource.



**Railroad Maintenance Cart (Anomaly 780)**

A clear sonar image of Anomaly 780 was obtained in May 2019 and MHM dove on the object in late July. MHM contends Anomaly 780 is a Railroad Maintenance Cart that would have operated on rails, towed by a handcart or something similar. It could have had a variety of uses for rail maintenance work. Its odd width of 8.00 feet and its odd length of 3.00 is the best indicator of its use on a railroad. No wheels survive, but

Anomaly 780 was constructed of heavy wood with metal fittings, including a tongue that would be attached to a handcart. The tongue also extends beyond the 3.00 length of the cart, an indicator that it could be attached to the tongue of another cart, creating a small train of sorts. The Railroad Maintenance Cart is a protected submerged cultural resource.

Photographs by Josh Knutson and Kelly Nehowig

**Anchor and Rock (Anomaly 805)**

MHM suspected that Anomaly 805 might be a large rock prior to diving on the object, but for the sake of thoroughness, it was investigated in early June 2019. While the object is a rock, a 12 pound blue anchor and its chain are wrapped around it. The Anchor and Rock measure 6.00 feet by 3.00 feet and it is a protected submerged cultural resource.

(Kelly Nehowig)

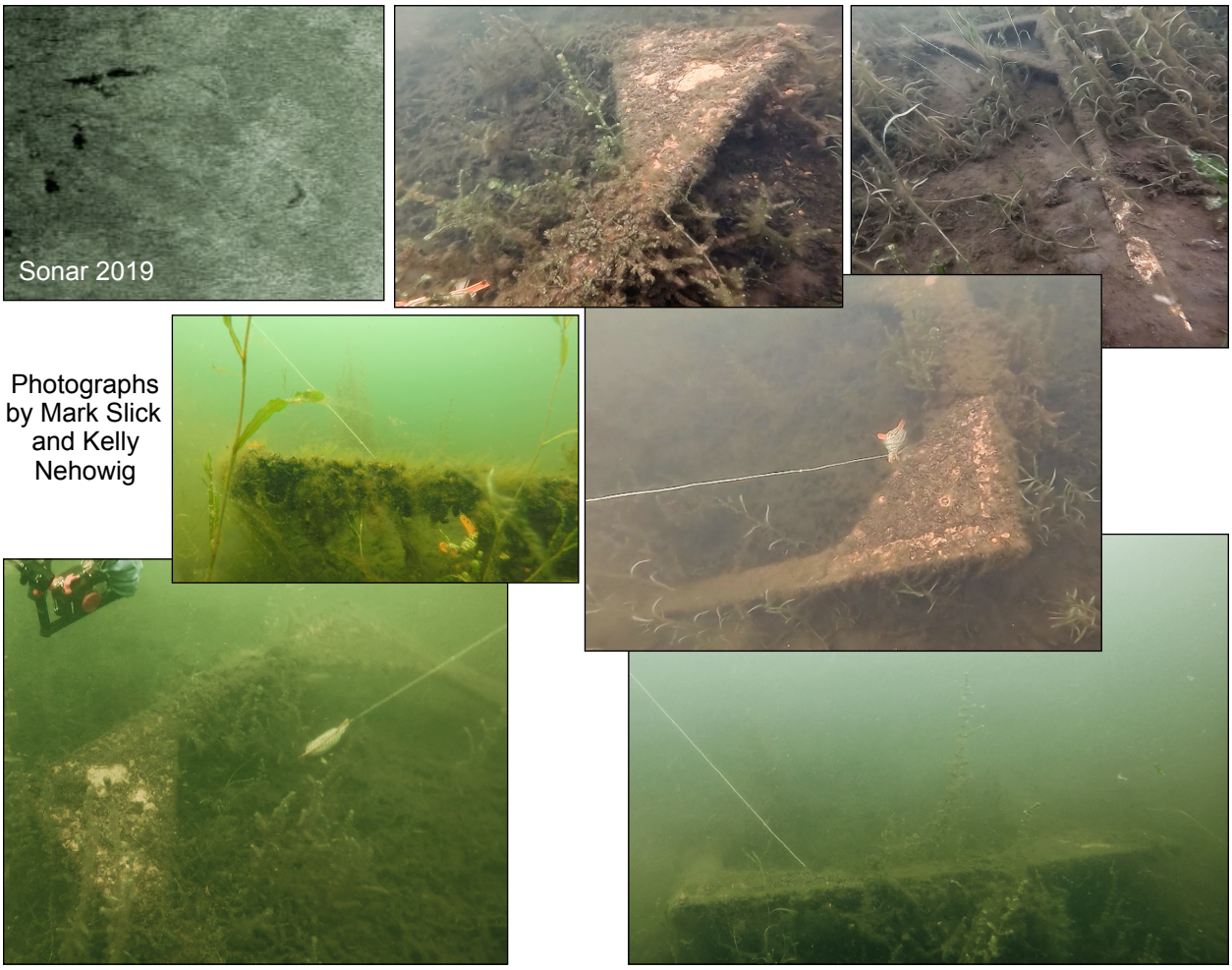
**Large Concrete Anchor (Anomaly 809)**

MHM suspected Anomaly 809 was a large piece of concrete due to its rectangular shape. However, it is actually a large anchor with a red metal loop set into it along with a short section of anchor chain. The Large Concrete Anchor is 6.00 feet long and is a protected submerged cultural resource.

Photographs by Josh Knutson and Kelly Nehowig

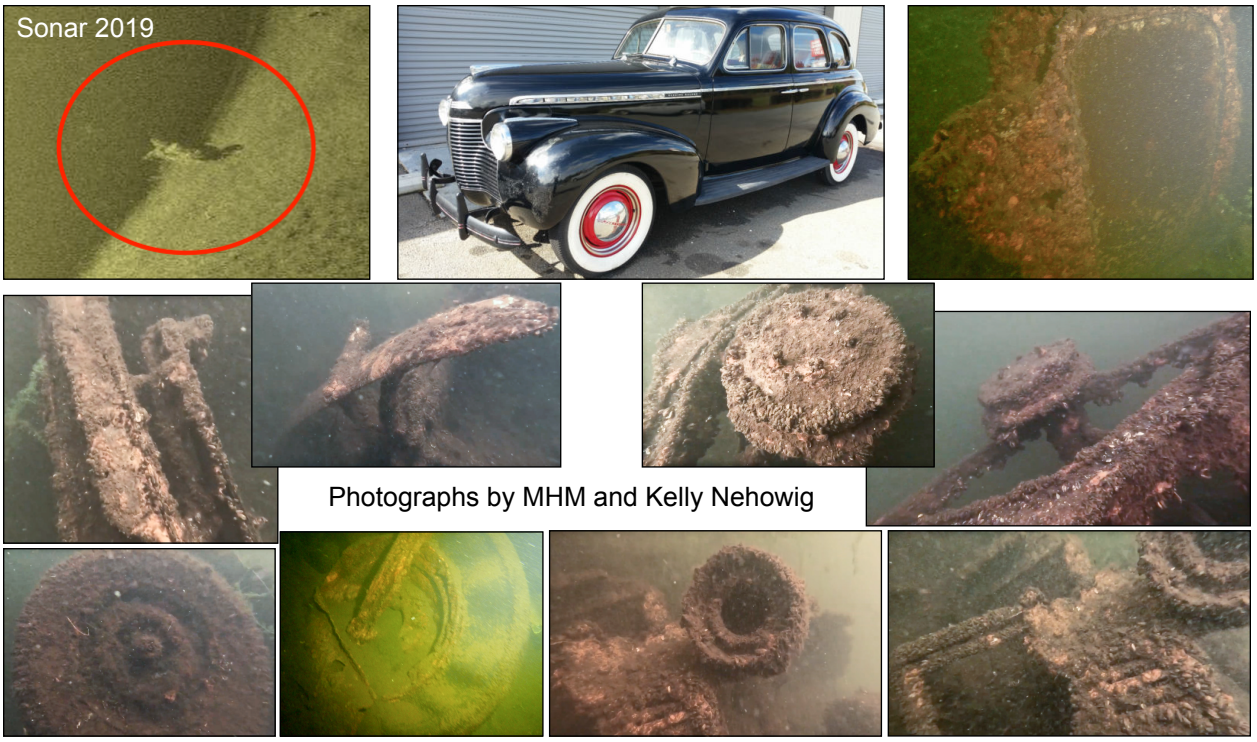
**Wall Frame (Anomaly 758)**

MHM recorded a detailed image of Anomaly 758 in May 2019; it appeared to be a rectangular barge. Diving on the anomaly in late May allowed MHM to identify the wooden framework as part of a building wall with metal corner braces on one end. It has been on the lake bottom for decades, but a precise date cannot be determined at this time, although it may be part of a building destroyed during the 1965 tornado outbreak. The Wall Frame is 22.40 feet long and 7.10 feet wide and is a protected submerged cultural resource.



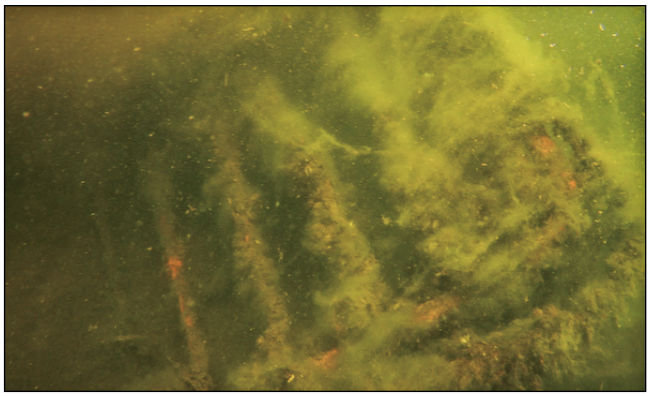

**~1940 Chevrolet Sedan (Anomaly 778)**

Anomaly 778 was identified as a car with most of its body rusted away. When the car sank, it landed on its right side and its left front tire survives in the water column, as does the left rear wheel hub. Many other attributes survive including both front fenders, the spare tire, the rear window (that has fallen into the car body frame), the dashboard, and the steering wheel. Surviving as diagnostic attributes, the shape of the grill, front fender, and the placement of the headlights suggest Anomaly 778 is a ~1940 Chevrolet Sedan. The car is 16.00 long and 4.50 feet long and is a protected submerged cultural resource.



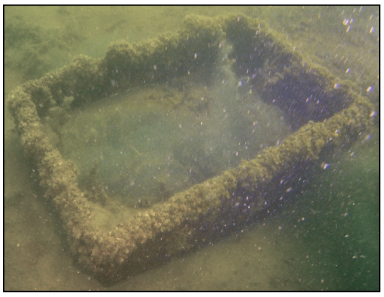

**Red Metal Object (Anomaly 770)**

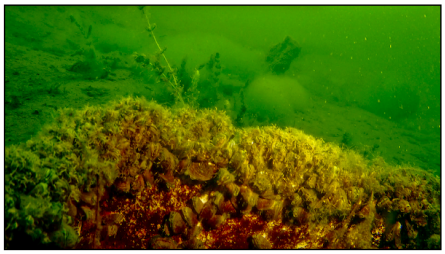
MHM recorded several sonar images of Anomaly 770 in May 2019 in an area that was not accessible during the 2011 sonar survey due to an abundance of vegetation. MHM is particularly interested in this area because a source has claimed that an airplane sank into the lake nearby. Anomaly 770 is 12.00 feet long by 4.00 feet wide and it stands 3.00 feet off the lake bottom. The anomaly is comprised to two large box-like objects that appear to be connected by a thin bit of metal on the lake bottom, as indicated by sonar. Red paint is found in different areas of the object and some edges are rolled - 'finished'. One end of a 'box' has a 'grill' pattern and it resembles a gate with rounded corners. At the bottom of the 'gate', some coiled upholstery springs can be found. The Red Metal Object cannot be identified at this point but MHM contends it is associated with Anomaly 771 (see below); further research on this anomaly is warranted due to the number of unanswered questions MHM has concerning this anomaly. Anomaly 770 is a protected submerged cultural resource.

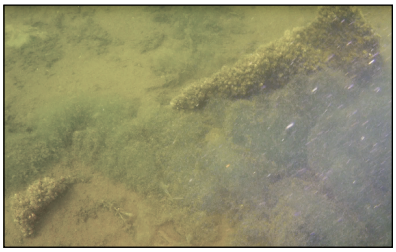


**Metal Rectangular Box and Twisted Piece (Anomaly 771)**

MHM recorded a clear image of Anomaly 771 in May 2019 and it was dove upon in early June. As the sonar indicates, the object is a 3.00 by 2.00 foot Metal Rectangular Box - painted/primed white inside and red on the outside - with a twisted piece of metal next to it. MHM contends Anomalies 771 and 770 are parts of the same, larger object. Anomaly 771 is a protected submerged cultural resource.







Photographs by Josh Knutson

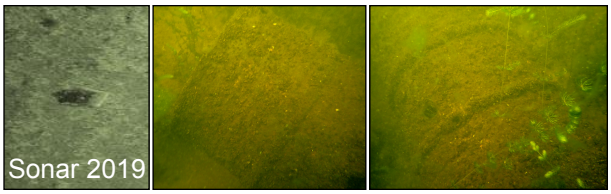
**Bench Cushion (Anomaly 798)**

During the LMNA-9 Project, MHM determined Anomaly 798 is a 4.00 long Bench Cushion. Due to its proximity to Anomaly 771, MHM suggests it may fit on top of the metal box portion of Anomaly 771. Therefore, it is possible that Anomalies 798, 771, and 770 are related to each other. Anomaly 798 is a protected submerged cultural resources.

**Barrels (Anomalies 743, 793)**

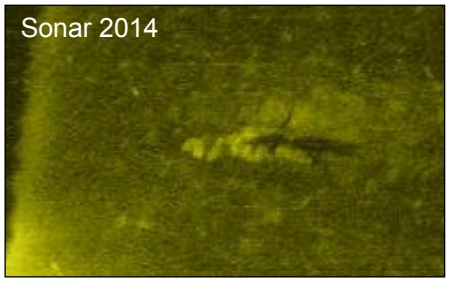
During the LMNA-9 Project, MHM investigated 2 anomalies that have been identified as Barrels, or 55 gallon drums. Most lakes in Minnesota have barrels in them, most often they are parts of floating rafts that have been dismantled. Anomalies 743 and 793 are protected submerged cultural resources.

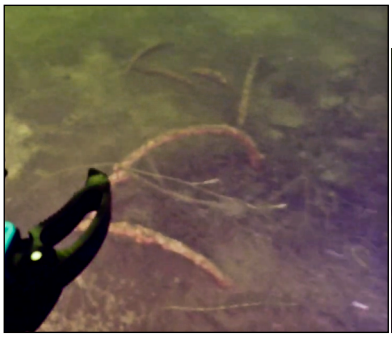
Photographs by Josh Knutson and Kelly Nehowig



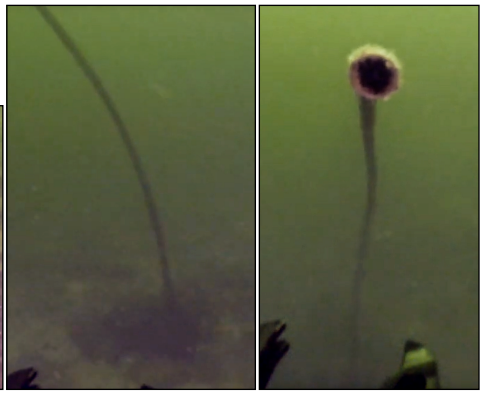

**Thick Wire Cable and Upright Pipe (Anomaly 482)**

MHM has repeatedly surveyed Anomaly 482 using sonar since 2011. Instead of diving on the object, MHM, volunteer Nehowig, and pilot Nothom located and recorded the site using an ROV. The sonar signature of Anomaly 482 was difficult to interpret correctly because it looked different depending on the direction the boat traveled. Initially MHM believed Anomaly 482 could be a collection of objects such as cargo from a boat, or simply a pile of rocks. Remote investigation using the ROV revealed the anomaly's acoustical signature matched the actual look of the artifact; it was just impossible to correctly determine its identity without visiting the site. MHM cannot determine when the cable and pipe sank to the bottom of Lake Minnetonka. Anomalies 482 is a protected submerged cultural resource.



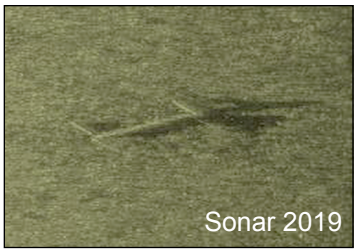



Photographs by Nick Nothom



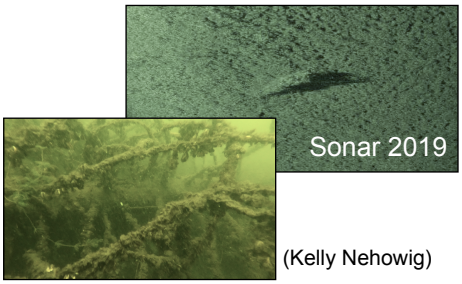
**Metal Girders (Anomaly 799)**

MHM recorded a clear sonar image of Anomaly 799, 2 Metal Girders lying in shallow water. When MHM was set to investigate them using SCUBA, it was decided it was not necessary since they could be seen from the water's surface, while the crew was still in the boat. MHM suspects the building materials fell off a barge at some point; Anomaly 799 is a protected submerged cultural resource.




**Christmas Tree (Anomaly 772)**

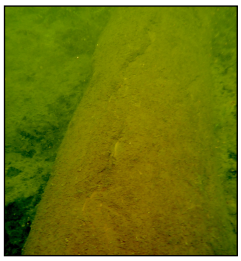
MHM's recorded sonar image of Anomaly 772 suggested it was a substantial object on the lake bottom, but it was not readily identifiable. MHM investigated the anomaly is early August 2019 and determined it was a discarded Christmas Tree.

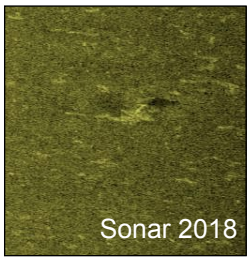



(Kelly Nehowig)

**Trees (Anomalies 492, 730, 801)**

MHM investigated 3 large anomalies during the LMNA-9 Project, suspecting they might be trees, and those assumptions were correct.


(Kelly Nehowig)

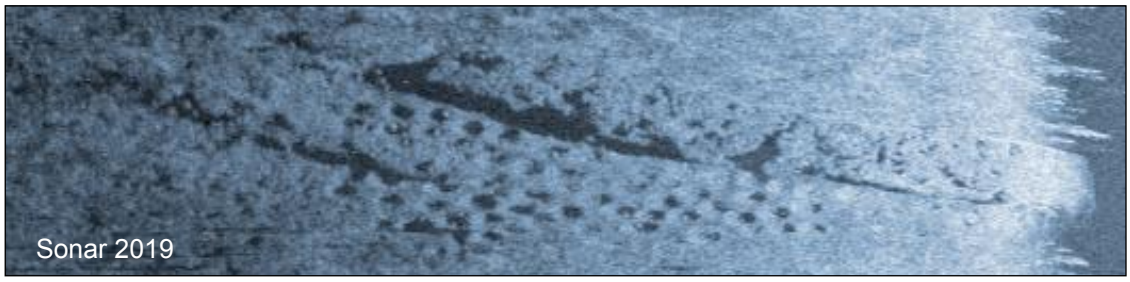


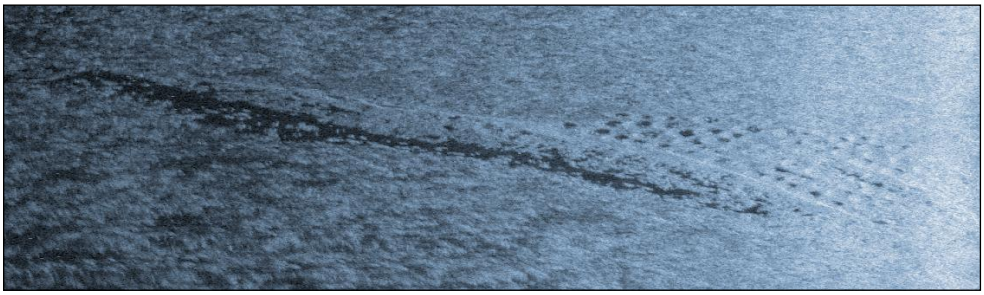
**Big Rocks (Anomalies 803, 804)**

MHM investigated 2 large anomalies during the LMNA-9 Project that, because of their significant acoustical signatures, warranted investigation. MHM was somewhat confident that Anomaly 803 was a wreck since it appeared that the starboard side was visible with a square stern. However, the anomaly is simply a rock with an interesting shadow. Anomaly 804's shadows are significant, but again, they are simply large rocks - and MHM could see them from the lake's surface, with no diving required.

**Geologic Feature (Anomaly 815)**

MHM recorded a detailed sonar image of Anomaly 815 after friend and supporter Mike Brill discovered it while fishing. MHM has previously seen this type of feature on the lake bottom and determined it was a fish hatching area, but Anomaly 815 was interesting due to its size - 60 feet long. The anomaly was confirmed to be a Geologic Feature with fish activity all over it during a brief examination using SCUBA.



## Conclusion

The LMNA-9 Project produced interesting and significant results, particularly identifying 7 new wrecks, 5 new maritime sites, 9 ‘other’ sites including 1 car, 2 barrels, 1 wall frame, a thick wire cable and pipe, metal girders, possibly related red metal and a cushion, a Christmas tree, 3 other trees, 6 big rocks, a large geographic feature, and 1 false target (A802). Further, 21 anomalies (A283, A626, A628, A655, A656, A699, A700, A704, A705, A706, A730, A752, A753, A759, A760, A761, A763, A779, A788, A799, A804) were identified remotely using only sonar since their distinctive signatures relayed enough information to MHM that diving on them was not warranted. Also, the opportunity to spend over 3 hours documenting steamer *Minneapolis* Wreck (21-HE-403) using an ROV donated by Digilabs and piloted by Nothom was invaluable for MHM's understanding of the site. Lastly, a visit to the gasoline launch *Theta* Wreck (21-HE-514) has supported MHM's contention that this wreck requires additional steps to insure her protection. Therefore, the final number of unknown anomalies identified during the LMNA-9 Project is 47. Further, all of the 7 new wrecks identified during the project were located using improved sonar equipment; previous sonar survey data was either ambiguous or objects were not recognized as submerged cultural resources.

These wrecks and sites join dozens of other submerged cultural resources already identified in the lake. Comparing and associating these new sites with known sites increases our understanding of the historical context within which these cultural resources operated or were exploited by Minnesotans. Firstly, the Open Barge Wreck (21-HE-529) not only represents 19th Century transportation, but the commercial waterborne activities associated with bulk cargo carrying. Like the NRHP property the Wayzata Bay Wreck (21-HE-401) - an 85-foot barge owned and operated by J.J. Hill and his partners, and the Half-Decked Barge Wreck (21-HE-505) - the Open Barge Wreck probably transported cut wood and timber from the Upper Lake to Wayzata, transferring the cargo to Great Northern Railway trains headed to the Twin Cities.[1] Beyond this association, the Open Barge Wreck is a tangible example of the skill and knowledge of Minnesota boat builders of the latter 19th Century. MHM contends a probable working life of over 15-25 years is not unreasonable. Like the Wayzata Bay Wreck, Half-Decked Barge Wreck, and the later Hopper Barge Wrecks Site (21-HE-441), 21-HE-529 is a rare example of her kind since work boats like barges were rarely preserved for future generations.

The 1 small wooden plank-built wreck identified during the LMNA-9 Project - the Overturned Wooden Scow Wreck (21-HE-531) - joins many other small wooden fishing and hunting boat wrecks preserved on the bottom of Lake Minnetonka, including the Fisherman's Friend Wrecks 1-4 (21-HE-485, 21-HE-489, 21-HE-499, 21-HE-509) and the Flat-Bottomed Rowboat Wreck (21-HE-488). These 5 small wooden wrecks were designed with athwartships bottom hull planking and hard chines; however, the Overturned Wooden Scow Wreck has longitudinal bottom planking and a rounded chine. The combination of attributes - scow ends, rounded chine, and longitudinal bottom planking found in the construction of 21-HE-531 - is unique in known Minnesota

[1]See MHM’s *Wayzata Bay Wreck National Register of Historic Places Nomination* of 2015 and the *Lake Minnetonka Nautical Archaeology 8 Project Report* of 2018.

small craft wrecks. Further, MHM is unaware of any surviving dry examples of small wooden watercraft in the State with these characteristics.

The history of the sidewheel steamer *Minneapolis* Wreck(21-HE-403) is well-known and her sinking was contemporarily reported in Twin Cities newspapers. Further, while sport divers have visited the site in previous decades, no comprehensive analysis of the wreck had been completed before the LMNA-9 Project. With 3 hours to investigate the wreck by ROV, MHM now understands the wrecking process that produced a complicated, broken-up, partially burned - and truncated from her original size - nautical archaeological site in deep water in Lake Minnetonka. Contrastingly, the gasoline launch *Theta* Wreck (21-HE-514) is in one piece, in shallow water - and in danger of damage from a variety of sources. The survival of *Theta* in her complete state on the bottom of Lake Minnetonka greatly enhances Minnesota's Maritime History - currently she is a one-of-a-kind nautical archaeological site in our State. MHM will consult with the OSA on an acceptable plan to provide *Theta's* 2 name plates with protection from further damage.

The Steel Row Boat Wreck (21-HE-530) is likely the 2nd earliest example of a small metal wreck so far identified on the bottom of Lake Minnetonka; the earliest wreck is the Steel Motor Boat Wreck (21-HE-510) that sank around 1930. With the possibility that 21-HE-530 may have been constructed by a Minnesota boat-building company, she is an important link in the State's metal craft production history. While her manufacturer - or home builder - is currently unknown, other Minnesota metal watercraft construction companies represented in Lake Minnetonka include Alumacraft, Larson, Lund, and Crestliner. All 10 small open boat-style metal wrecks - identified to date - on the lake bottom (not including 3 aluminum canoes) were not only produced by various manufacturers or represent home-builds, they are of different models from each other or carry different attributes from each other, supplying great variety in Minnesota's nautical and underwater archaeological records.

MHM has identified and rudimentarily analyzed dozens of wooden wrecks in Minnesota, including Lake Minnetonka. However, none of these wrecks constructed from wood were fabricated using plywood sheets. During the LMNA-9 Project, MHM located and identified 2 wrecks with plywood hulls - the Plywood Outboard Wreck (21-HE-528) and the Fiberglassed Plywood Outboard Wreck (Anomaly 764). While building boats with plywood instead of cut planks may suggest inferior construction, the layered nature of wooden sheets glued together - veneers - can produce superior plywood-fabricated watercraft. Additionally, the application of fiberglass onto the plywood hull of Anomaly 764 extended the working life of this small craft since she was built in 1959 (and possibly before that date) and was scuttled around 1976 or 1977, a significant amount of time on the water for a small wooden boat. For Minnesota's maritime history, the identification of 2 plywood wrecks fills in a gap in the corpus of boat types represented by submerged cultural resources in the State.

In shallow water, the Triple Pontoon Wreck (Anomaly 757) is large and obvious when recorded by sonar - when lake vegetation is missing or short - but MHM did not survey the area in 2011 in Spring, but during a time of tall weeds. Therefore, during the LMNA-9 Project, it was a pleasant surprise for MHM to record near-photographic sonar

images of Anomaly 757 in early May. Diving on the wreck in early June, it was discovered that the wreck, while not only being a pontoon boat, she has 3 pontoons - the first of this design identified by MHM in Minnesota.

The Upright 1986 Chris-Craft 260 Stinger SL LTD Wreck (Anomaly 749) is the first of this brand identified in Lake Minnetonka, and the only the second Chris-Craft recognized on the bottom of a Minnesota lake, the other being in White Bear Lake (the Judge's Boat Wreck). Also, 1 other wreck identified (to date) in Lake Minnetonka falls into the same class as Anomaly 749 - the 1982 Larson Delta Cruiser 7000 Wreck. While the Larson is substantially smaller than the Chris-Craft, she is a fiberglass inboard/ outboard fast boat with a cuddy from the 1980s. An obvious attribute of the Anomaly 749 site is her position standing upright in the water column. She joins 3 other Lake Minnetonka wrecks (Alumacraft Model A Wreck, Fiberglass Drag Boat Wreck, Red Fiberglass Wreck), 2 Prior Lake Wrecks (Fiberglass Hydroplane Wreck, Glasspar G-3 Skiboat Wreck), and 2 cars (AMC Rambler and a Chevy) in Medicine Lake that all stand vertically or near vertical in the water column. Submerged cultural resources that stand upright on lake bottoms are uniquely equipped to provide underwater archaeologists with details about sites that are not often accessible - particularly the hull bottom. Also, these sites - in terms of boats with floatation foam or other safety features - prove that vessels with heavy engines and motors will overcome the affect of such preventative measures when faced with a significant leak. In terms of Anomaly 749, while it is interesting to see the molded bottom of the fiberglass hull and its condition, the last several feet of the wreck's stern has attributes that would answer questions MHM still have about the Chris-Craft Stinger 260.

As more Minnesota wrecks are documented, the changes in watercraft design and construction will more completely fill-out the maritime historical record. Many of the smaller craft on the bottom of Lake Minnetonka represent over 140 years of our relationship with historical personal watercraft. When the internal combustion engine began to replace steam-powered boats in the late 19th and early 20th Centuries, watercraft operation by a single person became possible since a boiler operator was no longer necessary. The rapid development of the outboard motor set up the proliferation of personal watercraft, made of wood, steel, aluminum, and fiberglass. The higher speeds attained by internal combustion engines also led to changes in hull design.

Other maritime sites identified during the LMNA-9 Project, the Dock Piling Remains (Anomaly 755), Lifeguard Tower (Anomaly 740), Railroad Maintenance Cart (Anomaly 780), Anchor and Rock (Anomaly 805), and the Large Concrete Anchor (Anomaly 809), represent maritime infrastructure linked to the shoreline and large anchorages with unknown purposes. The investigation of 3 objects that may be associated with each other - the Red Metal Object (Anomaly 770), the Metal Rectangular Box and Twisted Piece (Anomaly 771), and the Bench Cushion (Anomaly 798) - has produced more questions as to their identities and purposes than answers. The ~1940 Chevrolet Sedan (Anomaly 778) joins 7 other cars sitting on the lake bottom. One of those cars is nearby Anomaly 778 and both may have been the subjects of a 'Dunk the Clunk' contest fundraiser between the years 1957-1968 (Merriman and Olson 2013, 47-51) Miscellaneous objects such as the Wall Frame (Anomaly 758), Thick Wire Cable and Upright Pipe (Anomaly 482), Barrels (Anomalies 743, 793), and Metal Girders (Anomaly

799) are among dozens of objects blown into the lake by strong storms or deposited there by the habit of disposing of unwanted objects on the ice or dumped from boats.

The diversity of nautical, maritime, and underwater sites so far identified in Lake Minnetonka are tangible examples of the rich maritime history of the area. Through research, diving on wrecks and anomalies to collect pertinent data, and ensuring that the collected information is accessible by the public, MHM will continue to investigate Lake Minnetonka's submerged cultural resources into the future. As shown by the 7 new wrecks identified by MHM during this project, the continued re-scanning of several sections of Lake Minnetonka is warranted. Comparison of sonar data recorded from different directions and various times during the Spring, Summer, and Autumn have revealed new sites, as well as facilitating the recognition of false targets that do not require reconnaissance using SCUBA. This new data allows MHM to produce smart and efficient dive plans; this will continue into the future. The results of the LMNA-9 Project summarized above is connected to all the work that came before and that will come after its completion. It is clear that the types of sites that exist in Lake Minnetonka are diverse, archaeologically and historically significant, and worthy of great attention. To date, the watercraft located on the bottom of Lake Minnetonka represent nearly 1,000 years of Minnesota's maritime history and nautical archaeology. In the historic period, the known wrecks represented in the lake span over 140 years of local maritime culture. The data collected during the LMNA-1-9 Projects have been utilized to create the ever-changing Lake Minnetonka Multiple Property Documentation Form, a guide that will be used to nominate Lake Minnetonka's submerged cultural resources to the National Register of Historic Places (NRHP). At this point, the Wayzata Bay Wreck (21-HE-401) has been successfully nominated to the NRHP by MHM. Lastly, the large and significant data produced during the Lake Minnetonka projects has and will be used for comparison purposes as MHM identifies wrecks and maritime resources on the bottom of other Minnesota lakes. To date, these bodes of water include White Bear Lake, Lake Waconia, Prior Lake, Lake Johanna, Medicine Lake, and Lake Pulaski.

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